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ERIE COU

SEPTEMBER 1, 1956
VOL. 151—NO. 9

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

LEARNING EARLY

Absorbed in deep concentration are these boys and girls attending summer programs at Mar Vista-Palms (Cal.) playground. Here Sidney Shepherd of General Telephone Co. of California describes 150-mc common carrier system in mobile radio.

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FLASHES AND PLUGS

NUMBERS WHICH AREN'T. The British telephone system has issued a new kind of directory, listing numbers which no one will answer. It is printed for the special use of radio and television script writers.

The need for such a service was apparently pointed up by an incident earlier this summer which affected one of Prime Minister Eden's offices. It all started when one of the figures in a mystery broadcast was told, "If anything happens, call Whitehall 5422," and pranksters and the curious carried on from there after the show.

•

BEHIND THE SCENES. John Nesbitt, who writes and narrates true-life damatizations for AT&T's "Telephone Time," (CBS) is characterized in a recent sketch in *TV Guide*, as a "large man of somewhat disheveled appearance, who hates Hollywood and loves stories." Continues the *Guide:*

"It is his pride and boast that he does not know where the Mocambo night club is, but has never forgotten a line he read or an anecdote that anyone has ever told him. In its way, this may constitute the greatest blow to Hollywood's self-confidence since the advent of television itself; for Nesbitt, at 47, is surely one of the best-informed men alive. . . .

"A few weeks after his current show went on the air, he was introduced to a businesswoman who had looked forward to meeting him but had assumed that the bland countenance and impeccable diction of his television appearances was the sum total of his personality. Nesbitt launched into a scientific discussion of crimes that left her overwhelmed and drew from her a reaction that is still amusing associates who know Nesbitt as a complex and unpredictable individual. 'My,' she said, 'I should have *rested* before I talked to him!' . . .

"Nesbitt says his 'total recall of memory' is the source of most of the true-life dramatizations he writes and narrates for Telephone Time. As a youth, he met 'The Golden Junkman,' a San Francisco salvage dealer whose winning of a college degree in middle life was the plot for the first program in the series, which started last April. 'The Man with the Beard,' the shocker about persecution in 19th-century Massachusetts, which followed, goes back even farther in Nesbitt's personal life: to a visit his one-eyed grandmother from Illinois paid to San Francisco when John was a boy of 11.

"A crack rifle shot—she lost one eye in a kitchen accident as a young housewife—she spent her afternoons at a shooting gallery, to the delight of her prize-laden grandchildren, and her evenings raising their little hackles with stories she had heard as a girl. One concerned a Massachusetts farmer who was jailed for growing the only beard in town. Thirty-six years later, Nesbitt hired a researcher to find his tombstone and court record and televised his injustice. . . .

"These tales don't necessarily have to be about people. In New York last spring, scheduled to appear at a pre-network showing of Telephone Time, Nesbitt kept the press waiting for an hour, and finally showed up with two expensive porcelain horses under his arm. 'Real Ming,' he explained, 'I thought there might be a story in them, so I went in to talk to the art dealer.'" . . .

CIRCULATION

Guaranteed circulation of this issue is 11,333 of which 10,809 is paid.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

September 1, 1956

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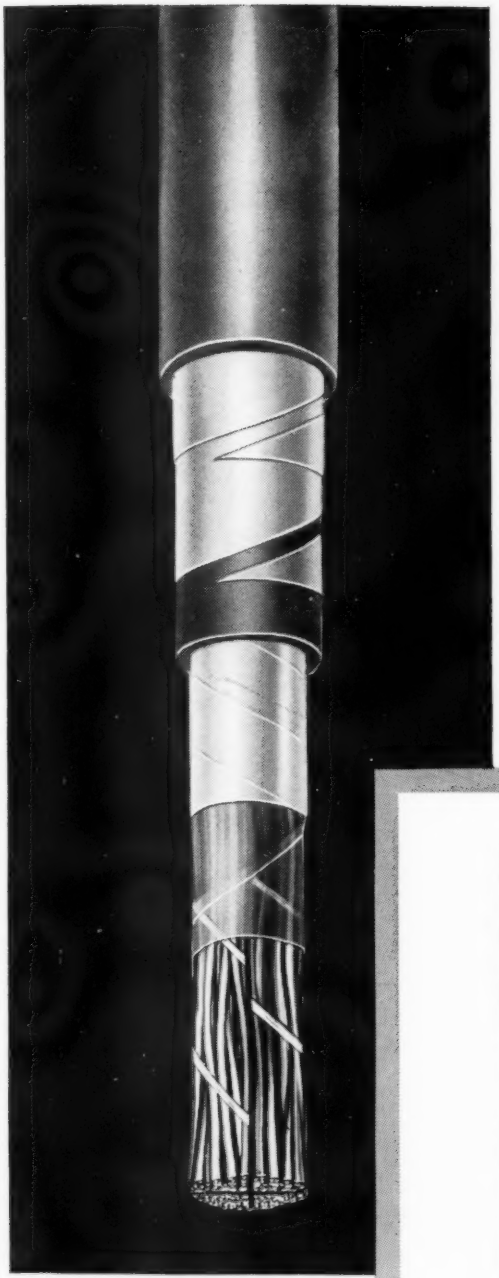

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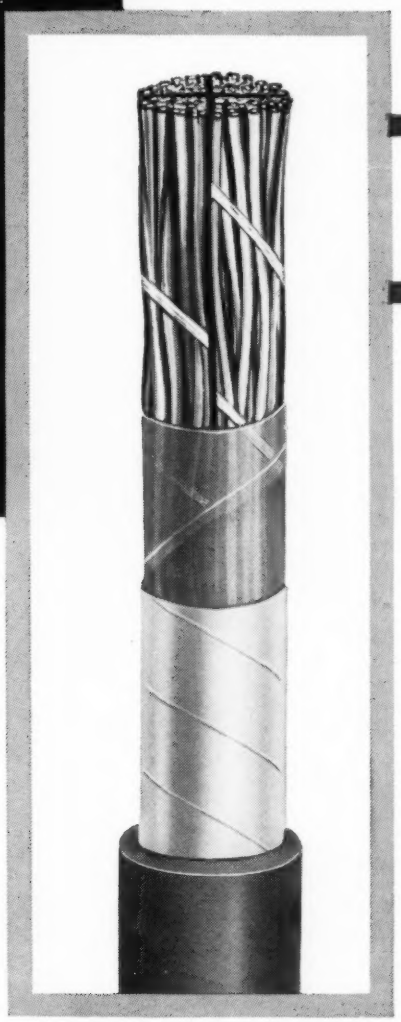

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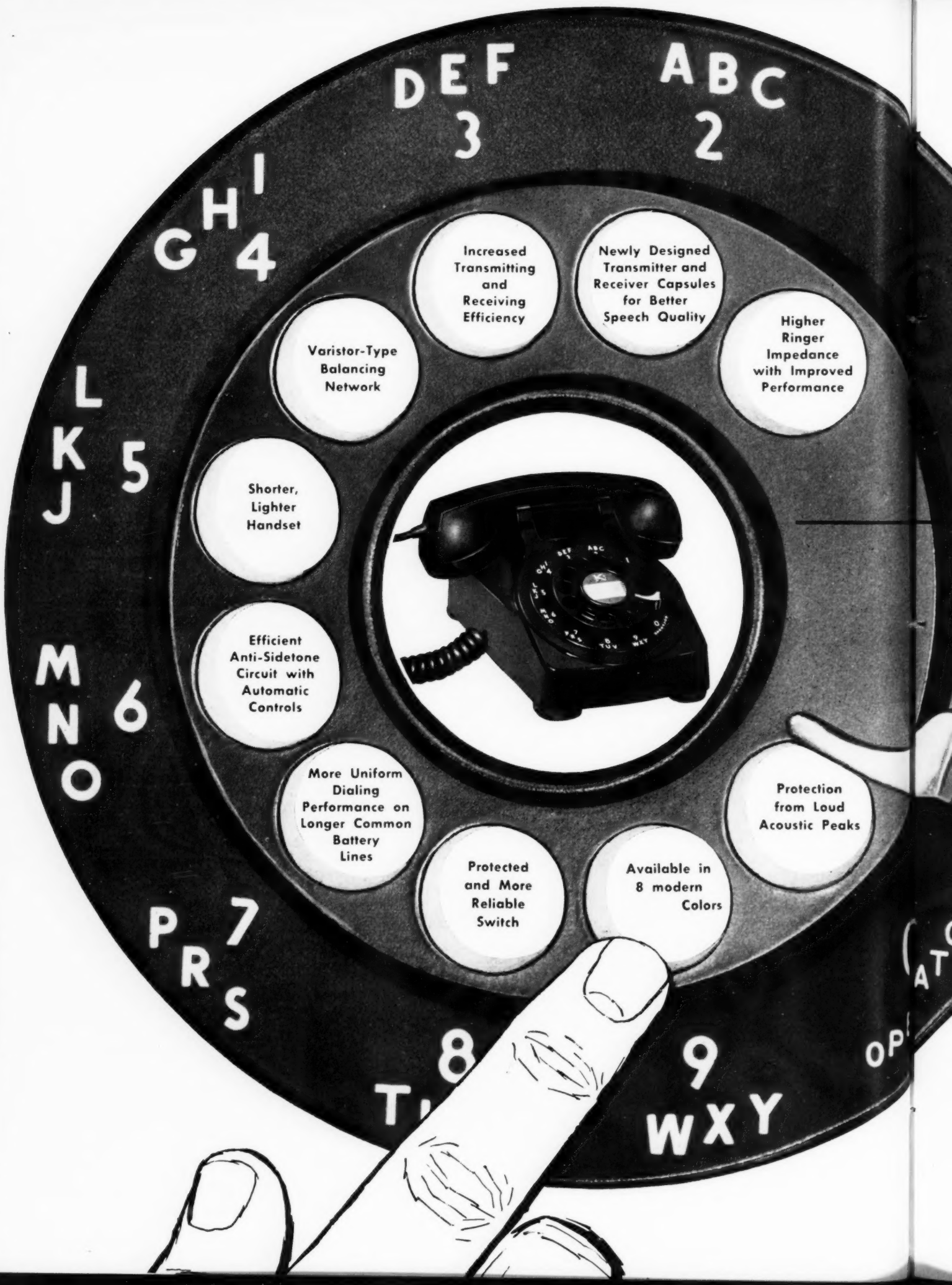
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3. Western Union phone numbers.
4. Telephone numbers of local companies receiving frequent long distance calls.
5. Frequently called direct circuit points and tributaries.
6. DSA Toll points.

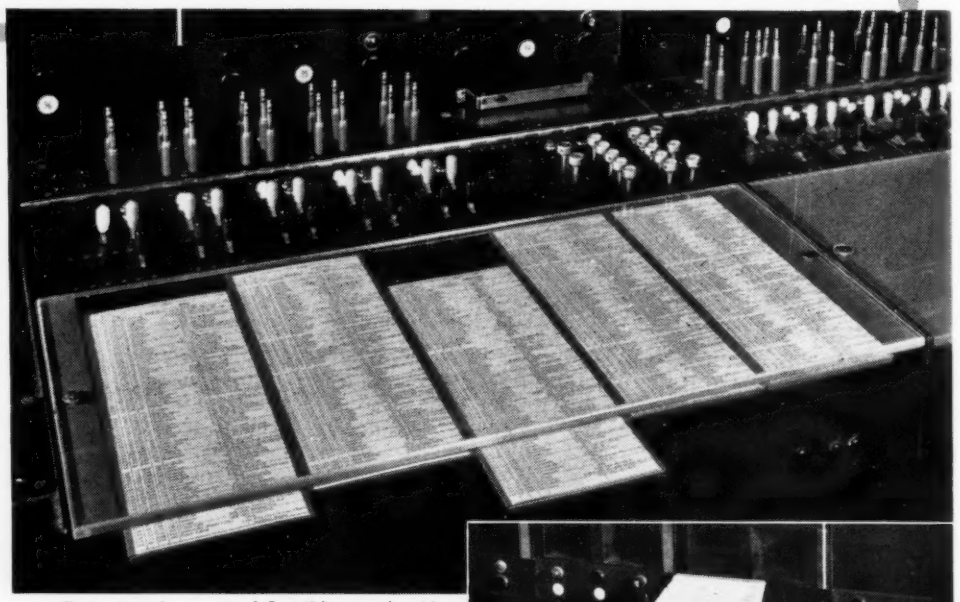
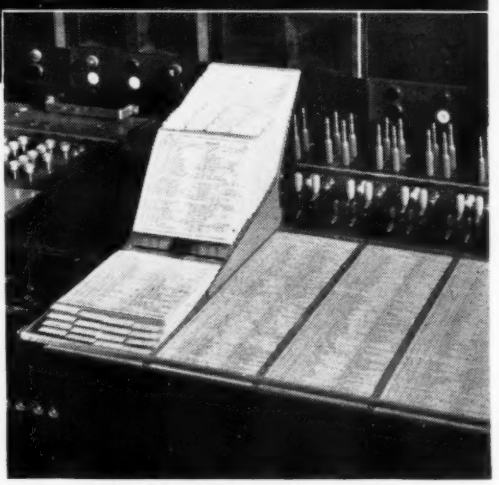


Illustration shows set of 5 visible panels with shim at each end—over-all width 21 31/32".



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with
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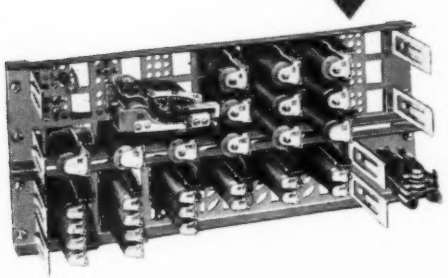

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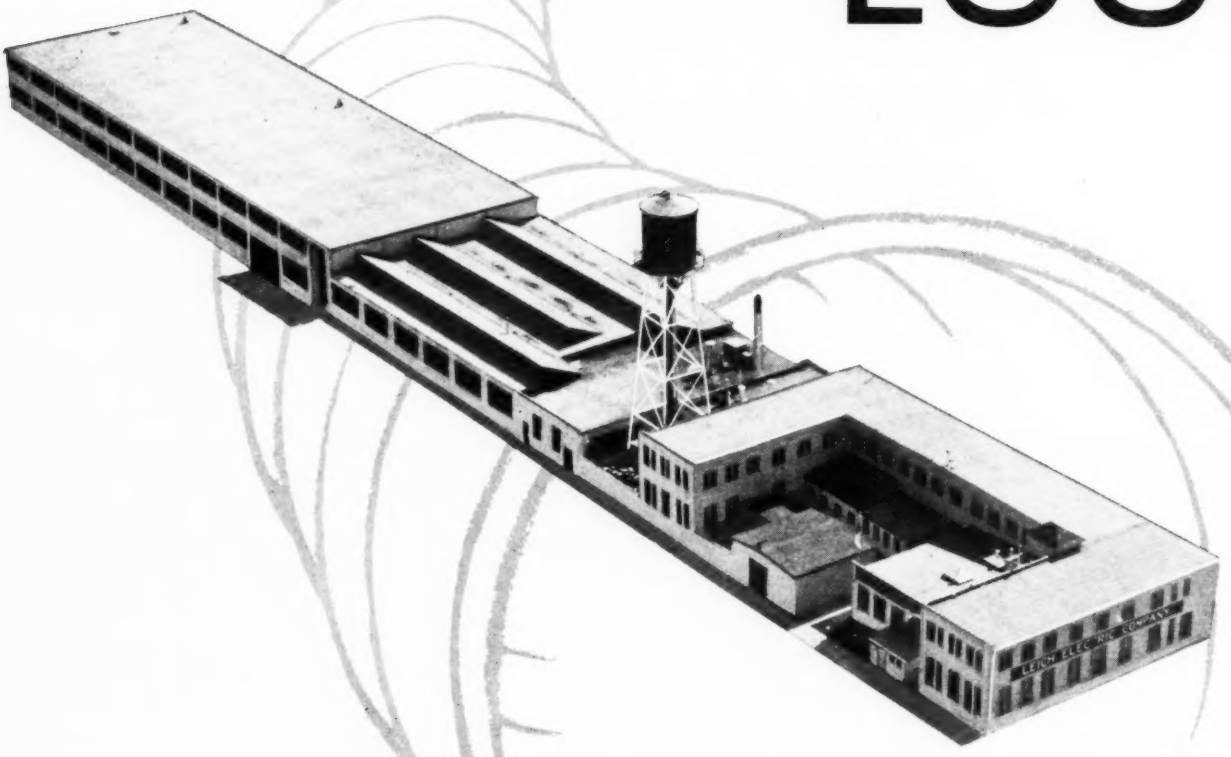

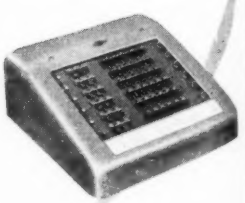

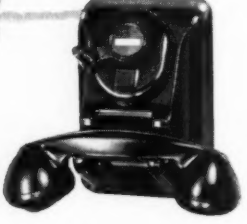

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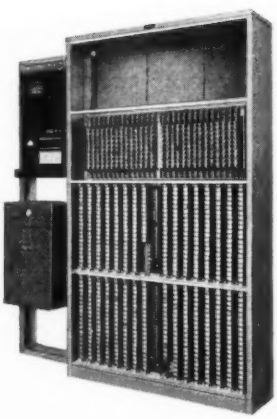
TO LEICH...



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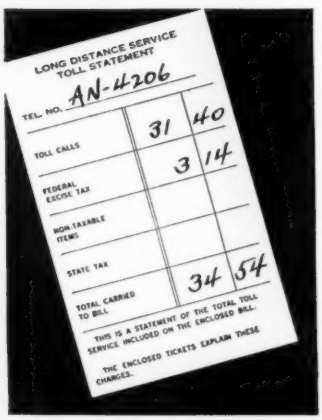
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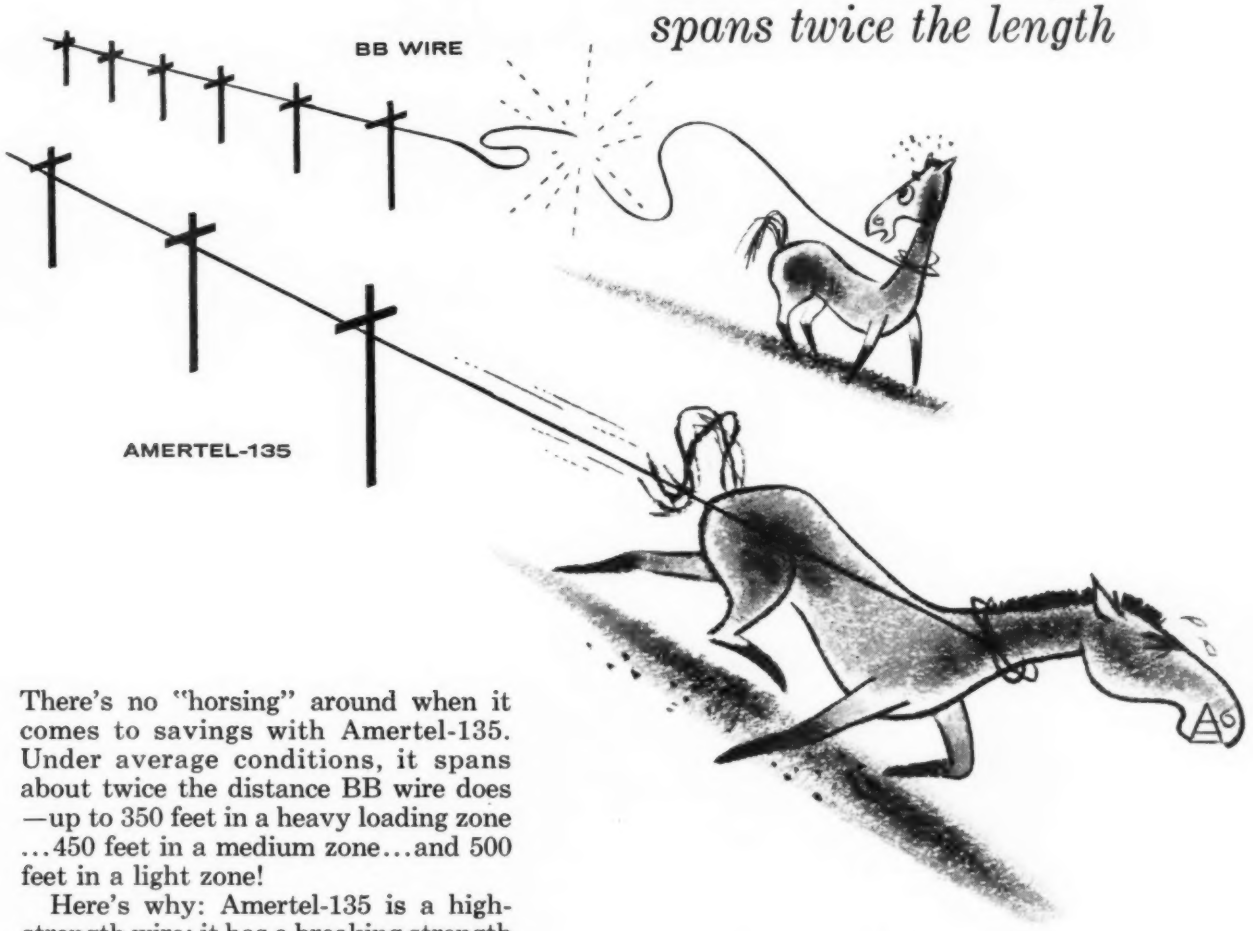

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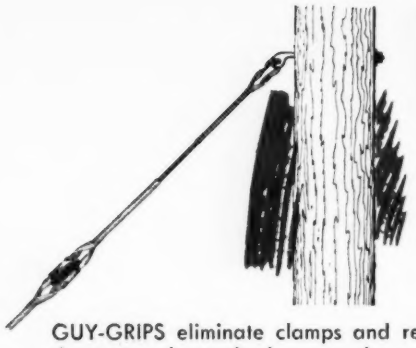

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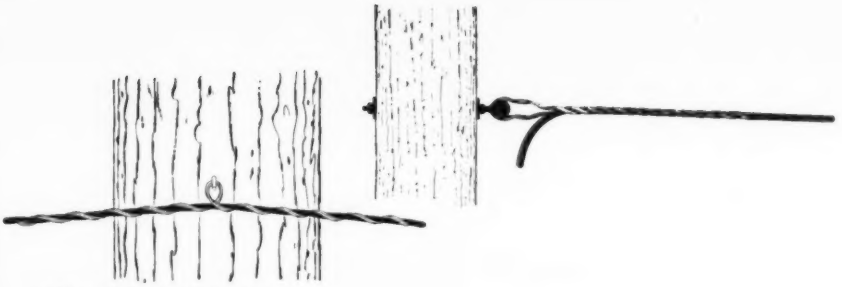

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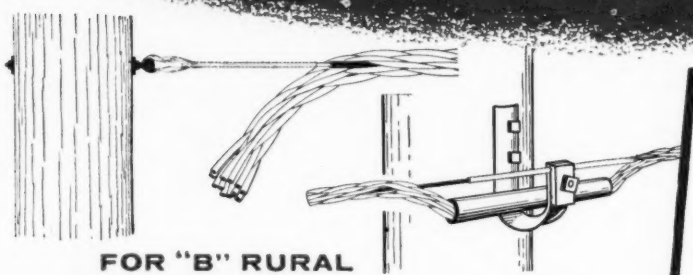

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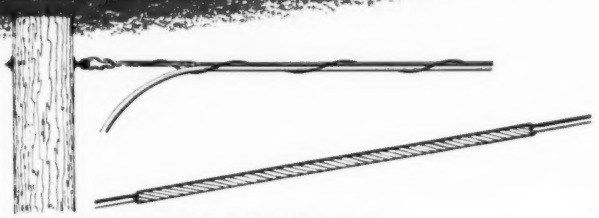

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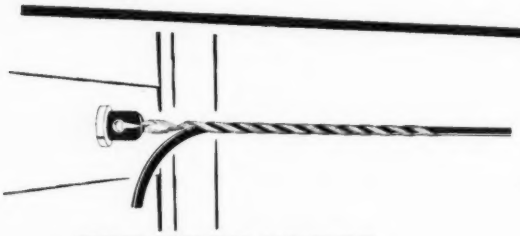

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Reviews Republican and Democratic platforms—which candidates, in acceptance speeches, humbly embrace the great undying principles of these magnificent documents, and then promptly forget all about them, or else interpret them to suit themselves. Forty-seven states adopt laws to punish telephone long distance "cheaters."

MOST OF US can recall the old-fashioned two-man streetcar. It had a special platform near the entrance for the motorman, and a sign warning passengers not to ride on the platform. It was during that period that the late Will Rogers made one of his sage political remarks, when he stated: "Party platforms are like streetcar platforms; they are made to get in on, not to stand on." Another cynical definition is that "a political platform is something that a politician stands on before he gets in, but often falls down on before he is thrown out."

All of which points up the acknowledged fact that for all the fuss and bother about the exact wording which goes into, or is kept out of, party platforms, nobody takes them very seriously once they are adopted. Anybody who bothers to remember exactly what language was contained in any given party platform of bygone years is likely to be either a professional quiz contestant or an eccentric.

Generally, the candidates on both sides make showy acceptance speeches in which they "humbly embrace the great undying principles of this magnificent historic document," and then promptly forget all about it, or else interpret it to suit themselves.

Nevertheless, there *has* to be a platform, if for no other purpose than to serve as an official and ostensible outline of what the party is supposed to stand for. It does not matter that there are often wild inconsistencies, promising to spend lavishly for more welfare and public projects, while at the same time reducing taxes, cutting the public debt, and strengthening the national defense.

Such platform defiance of the economic law of gravity has become the commonplace accepted usage. It has reached the point where the typical platform draftsmen are in a position to say, to almost anyone who cares to ask—farmer, worker, businessman, or Indian chief—"You name it, brother, we got it!"

Nevertheless, anyone interested in any particular industry, like a farmer, an organized worker, or a member of any other economic group, naturally likes to see what the platforms have to say about his business, if anything. And public utility people are no exception. So, let us see what there is in these two national 1956 political grab bags for the public utilities.

First, as to the telephone business directly, there is only a brief pledge in both party platforms to continue the REA program, including rural telephone loans. The Democratic language is found in a long list of promises (under the heading of "Agriculture") to assist the farmer. It simply states the party's objective "to insure reliable and low-cost rural electric and telephone service." The Republican platform pledges that party "to expand rural electrification through REA loans for generation and transmission and to expand rural communications facilities."

On the subject of general business regulation, the Democratic party pledges itself "to the restoration of truly competitive conditions in American industry. Affirmative action will be taken . . . to curb corporate mergers contributing to growth of economic concentration."

As an aid to small business, the Democrats pledge themselves to strengthen and enforce laws "designed to prevent monopolies and other concentration of economic and financial power." There is also a rather teasing reference to "tax relief for all small and independent businesses by fair and equitable adjustments in federal taxation which will encourage business expansion. . . ." Just how this could be done legally is not stated or hinted.

Republican planks on business assistance point with pride to the Eisenhower record but expressly makes no distinction between small, medium or large businesses. "We believe in good business for all businesses." (That's safe enough.) There is a pledge for "the continuation and improvement in our drive to aid small business." But there is nothing definite; only general hints that "small business can look forward to expanded participation in federal procurement—valuable financing and technical aids—a continuously vigorous enforcement of anti-trust laws—important cuts in the burdens of paper work and certain tax reductions as budgetary requirements permit."

In the gas utility field, the Republicans patted the producers on the back with a statement "we favor reasonable depletion allowances." This refers to the 27½% deduction for taxes which the oil and gas producers get under present federal tax law, originally passed by the Democrats.

But neither party platform had a word to say about the controversial bill, passed by the 84th Congress and vetoed by President Eisenhower, to exempt independent natural gas producers from the jurisdiction of the Federal Power Commission. This may strike some as surprising in view of all the fuss kicked up in the Senate at the recent session. But the answer lies in the fact that this controversy cut squarely across both party lines. In such a situation, party platforms are usually judiciously silent.

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Not so with respect to the electric utilities, the favorite and perennial whipping boy of the Democrats. They really lowered the boom on the power companies with respect to the so-called "give-away" issue, involving criticism of administration policies dealing with the development and distribution of power from federal projects.

Altogether the Democratic platform devoted an unprecedented amount of language—over 1,200 words—covering a whole range of related subjects in which the power companies are the expressed or implied villians. Here is the list:

(1) Failure to put the Atomic Energy Commission in the atomic energy business.

(2) Criticism of the Eisenhower administration over the Dixon-Yates contract.

(3) Another blast at the GOP for the Hell's Canyon electric company licenses.

(4) Ditto for the administration of TVA and the enforcement of the Holding Company Act.

(5) Strong pledges for additional federal hydro power development (more valley authorities a la TVA).

(6) Something new in government power expansion: "Integrated regional transmission systems."

(7) Hurrah for the REA electric (and telephone) programs.

The Republican platform, on the other hand, brushes all this off with a mere 300 words. It reaffirms Eisenhower's "partnership" policy for power developments. It pledges "to support preference to public bodies and cooperatives under the historic policy of the Congress." That is a new step for the GOP in the direction of favoring public ownership. But the platform builders probably figured that the "preference clause" is here to stay, and power companies cannot vote. So, what has the GOP got to lose?

Judging from this relative platform emphasis, the coming campaign is likely to turn into a one-sided argument, on the so-called "give-away" issue. The Republican orators will ignore it as something that does not exist. But the Democrats, especially the vice presidential candidate, Kefauver, and former President Truman (to the extent that they let him campaign), seem to be already obsessed with this subject. They are almost sure to devote an enormous amount of jaw and lung energy to criticizing the administration's policies with respect to electric utilities. With the Republican emphasis on peace, prosperity, and other issues, the campaign discussion with respect to matters affecting public utility industries is thus likely to provide more political monologues than actual head-on conflicts of views.

Summing up both platforms as a whole, the proportion of wheat to chaff is about the same in both. The Democrats' job is longer and windier, although the GOP model is certainly nothing to recommend for light summer reading. But even the excess Democratic verbiage is understandable. After all, the GOP people are already in, and must run on Ike's record. The Democrats want to get in, and have to run on promises. Promises always run longer than performance by any word count test.

There were some idle gestures in both, which should fool no one. There was, for example, that hardy old favorite "repeal the Taft-Hartley Law," which both Democratic and Republican congresses have repeatedly failed to do. But it was thrown into the Democratic job—doubtless on the theory that it might snag a few extra labor votes.

The sudden conversion of the Democrats from free trade to protective tariff to protect industry from cheap foreign labor might surprise some, and make William Jennings Bryan spin around in his grave. But the hard fact is that the South is now processing cotton into textiles, as well as raising it. So, the Democrats can be very practical folks about hard facts when there are votes to be gathered.

Taken all together, these two platforms are about par for the political course. They can now be filed away neatly in the newspaper morgues,

Two New REA Loans Total $1,445,000

Dial service for 2,919 farm families and other rural subscribers in California and Kansas was planned through use of loans of $1,445,000 which the Rural Electrification Administration made the week of Aug. 12. Details of the two loans to the telephone companies are:

Siskiyou Telephone Co., Etna, Cal., was extended a loan of $797,000, its first REA loan.

The new borrower is a commercial company incorporated in 1896 and now providing magneto and common battery service to 723 subscribers in Siskiyou County.

REA loan funds will be used by the Siskiyou company to provide dial service to present subscribers and to 497 additional farm families and other rural subscribers. Construction will include automatic central office buildings at Fort Jones, Happy Camp, Etna and Hamburg. The rebuilt system will have 162 miles of new line. Of the existing line, 70 miles will be continued in service, 137 miles will be rebuilt. On completion the company will be serving 1,220 subscribers with 369 pole miles of line through four automatic exchanges.

President of the company is P. A. Dannenbrink; the manager is Mrs. Eleanor Hendricks.

*

J. B. N. Telephone Co., Wetmore, Kan. (temporary mailing address: Netawaka, Kan.), on Aug. 16 was extended a loan of $648,000, first loan, to improve and extend rural telephone service in Brown, Jackson, Nemaha and Pottawatomie counties.

The borrower, a commercial corporation, plans to provide service for the first time to 350 farm families and improved service for 1,349 existing subscribers. The J. B. N. company operates, as separate corporations, the Wetmore Telephone Co., and the Netawaka Mutual Telephone Co.

As a nucleus for the new service, the company plans to acquire with its own funds properties of the Fairview Telephone Co.; the Goff, Havensville and Soldier exchanges of the United Telephone Co. of Kansas; and subscriber-owned lines switched by the Havensville exchange. In addition, the borrower will acquire through merger the assets and liabilities of the Wetmore Telephone Co. and the Netawaka Mutual Telephone Co. The acquired facilities now are providing magneto service for 1,349 subscribers over 386 miles of line. This includes 123 switchers.

The borrower proposes to construct automatic central offices at Fairview, Goff, Havensville, Netawaka, Soldier and Wetmore, and 115 miles of line. Of the present line, 119 miles will be used in place in the rehabilitated system, and the remainder retired.

J. C. Carson is president of the company.

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along with all the trick pictures, and windmill speeches and funny hats of the two convention circuses.

During the forthcoming campaign, a political orator, here and there, in a more reflective mood, may refer to them casually.

Four years from now they will be dug out to furnish points of departure and comparison for the drafts of the *next* political platforms.

Meanwhile, they will have about as much real significance as yesterday's stock market quotations or an Elvis Pressly rock-and-roll recording, two or three years from now.

The Revolt of Big Ed

Big Ed Johnson, Governor of Colorado, has declared war on the Federal Communications Commission (FCC). He has not yet run up the red flag of revolt over the state house in Denver, but then it could happen any time. Big Ed, who used to be a sort of congressional boss over FCC when he was a U. S. Senator from Colorado and chairman of the Senate Interstate Commerce Committee, is no babe in the woods when it comes to feuding with federal agencies. He has had plenty of experience.

Specifically, Governor Johnson has issued an executive order, which figuratively thumbs his gubernatorial nose at the FCC for not allowing an appliance dealer in a small Colorado town to boost television broadcasts from Denver over the surrounding hills. The FCC had refused a request by W. R. Webber of Steamboat Springs, Colo., to operate such a boosting station in his mountain-rimmed community of 2,000 inhabitants.

Big Ed took all this in his stride. His executive order appoints Webber to be a one-man "official communications staff" to the governor. It directs Webber "to continue to serve the people of Steamboat Springs without charge by boosting 'on channel' the TV signal of (Station) KOA-TV," serving the Denver area. What's more, the big rangy Colorado governor hoped the FCC would pick up the challenge. He wants Colorado to become a testing ground for "the arbitrary and incomprehensible action of the FCC to deny entertainment and education to people in isolated areas."

He says it might lead to the spread of television to other hill-surrounded communities in Colorado and elsewhere. He points out that Webber's booster operation in Steamboat Springs does not interfere electronically or otherwise with any TV broadcast either interstate or intrastate.

What was the FCC's answer to this defy? No action, and no comment. Not right away, anyhow. The FCC has already ordered other similar booster stations in the Pacific Northwest off the air. At least one of them, in Bridgeport, Wash., has appealed from the commission's cease and desist order to the U. S. Circuit Court of Appeals for the District of Columbia. But with the appliance dealer in Steamboat Springs operating under an executive order of the governor, the FCC is going to think twice before sending out any boys with the federal patrol wagon.

What is going to be the outcome? Will Big Ed win in his valient battle against the Washington bureaucrats? Will there be soft music and wrestling matches in Steamboat Springs? Will Colorado secede from the Union? Will federal troops be sent to Denver? Keep tuned to this station, WELCH, for the next exciting episode in this great human interest drama. And now an interesting and important message from our sponsor. . . .

Anti-chiseling Laws

A recent item in *The Wall Street Journal* discloses the information that, since April, 1955, 47 out of the 48 states (Wisconsin dissenting) now have laws making it punishable to cheat on the telephone companies by faking uncompleted long distance calls. These laws do not put the offenders in the penitentiary. But the punishment fits the crime. Telephone companies are permitted to refuse service to known swindlers.

The Bell System and other telephone industry people have long been active in trying to abate this nuisance, which seems to be increasing to the extent of millions of dollars in lost toll revenues. Most readers of this department are doubtless all too familiar with the way in which the game works. The commonest abuse is for the traveling businessman, who is a toll call swindler, to get information of his safe arrival in a distant city by simply placing a person-to-person call to himself at his home residence. The call is naturally refused and incompleted. Thus, the little woman knows that the big stinker has arrived at his destination, safe and sound.

But there are other variations of this practice, involving elaborate code devices. By faking names and numbers of addresses, and in other ways, dishonest shippers are able to transmit commercial information about the date and contents of various shipments and considerably more detail.

The authority for public service commissions to permit or direct the discontinuance of service, which is being stolen or abused for illegal purposes, is very old and well-settled. It could probably be found even in the case law precedent—court-made law—of a good many states. Gas and electric companies, for example, have for many years penalized "meter jumpers" by cutting off their service and refusing to reconnect without advance guaranty, including deposits and settlement for estimated losses.

In some cases the practice has been to install operating protective "jumper proof" armored meters, at the customer's expense. Regulatory commissioners usually go along with these measures, where they are taken in a reasonable manner. Sometimes advance provision must be made in the operating rules of the utility company, on file with the commission. Sometimes there is a requirement for complaint and hearing before permanent disconnection.

Tracing telephone toll swindling, of course, is a much more difficult thing than catching "meter jumpers," not only with respect to detecting but also proving the offense. And even after the swindling has been established—despite the usual defenses about "unauthorized persons having access to the telephone," etc.—permanent disconnection of the swindler is pretty hard form of discipline to enforce. Generally, a good stiff advance deposit requirement and reasonably close monitoring of toll calls to and from offending stations will correct the abuse.

But some of these swindlers are quite stubborn. And the ingenuity they put into chiseling a few dollars from the telephone company would probably make them very successful if it were invested in a legitimate enterprise. But some folks are so fascinated by making a "fast buck" that they would rather do it that way than make two bucks honestly.

So, the telephone industry will probably need these state laws, and perhaps an eventual revision of the Federal Communications Act if the abuse keeps spreading.

Atomic Power Aims

"We are in this to make money and provide economical power."—GEORGE WHITE, *General Electric Co., atomic power development department.*

Joint Endeavor

"Just as truly as each of us has a stake in America, so, too, do we have a stake in Capitalism, for without Capitalism, America as we know it today would not exist."—EDITORIAL STATEMENT, *Los Angeles Times.*

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PROTECTION PROBLEMS

in Telephone Distribution Systems

By J. W. PHELPS

RECENT YEARS have seen some interesting innovations in telephone distribution systems. Principal among these innovations from the standpoint of the person entrusted with the protection of telephone wires and cables is the rapidly expanding use of plastics as conductor insulating materials and as cable sheathing materials.

Polyethylene (and to a lesser degree, polyvinylchloride) has given to the designer and manufacturer of wire and cable products a high dielectric strength material with the further attributes of toughness and long life, which is at the same time relatively impervious to water and a large number of corrosive substances.

To the electrical protection engineer these various attributes have been by and large helpful, due mainly to the high dielectric strength of polyethylene as compared to the commonly used paper dielectric material.

When new materials or techniques are inserted into an older, well understood system, it is almost a truism that some unforeseen problems will arise. Such is the case in the protection of telephone cables and wires with plastic insulating and sheathing materials. In order to examine these new problems it might be advisable first to review some of the protection schemes that apply to paper insulated facilities so that a comparison can be made.

We should bear in mind all the while that the wire network in an exchange area consists of cables of various sizes and lengths and of unshielded wires, all varying widely in degree of exposure to foreign voltages. Consequently, no two exchange systems are protected in precisely the same fashion. Instead, many sections, due to their physical layout and exposure to foreign voltages, are protected in a tailor-made manner.

Protection of Paper Insulated Lead Sheathed Cables

There are three ways in which lightning currents may be impressed on telephone cable conductors. They are:

(1) By direct strokes to the telephone system.

(2) By inductive coupling between the telephone conductor and the lightning channel.

(3) By conduction from open-wire extensions or drop wire loops which have had impressed upon them lightning currents from direct strokes or by other means.

Direct strokes do occur on telephone plant, but their rate of occurence is so low that the protection apparatus necessary to guard against their destructive effects is normally not used. There is a much larger number of induced lightning surge currents impressed on the telephone plant, but in general they are of smaller magnitude than those which reach the cable conductively. If, therefore, protection apparatus is designed and installed to handle safely the conductive surge currents, in item 3, induced currents will in general do no damage to the cable system.

Since a drop wire run is generally much shorter and less severely exposed to lightning than an open-wire extension, it collects and transmits to the cable fewer surges than does an open wire extension. Surges at cable—open-wire junctions may have crest currents in excess of 6,000 amperes, as shown on *Fig. 1*. This figure, based on data gathered in 211 measurements, tells only the distribution of the surge current magnitudes. The frequency of occurrence of these surges is a function of the number of thunderstorms annually in any particular part of the country (See *Fig. 2*), and to a lesser degree, topographical characteristics, soil resistivity and the presence or absence of objects which might shield the telephone network.

It is apparent, therefore, that during each period of thunderstorm activity, a number of surge currents are transmitted over open-wire conductors to the cable to which they are connected. There is frequently sufficient potential present to cause arcing between the open-wire conductors so that the whole open-wire lead is effectively energized. The currents so transmitted enter the cable at the junction and raise the potential of the connected cable conductors.

Voltages are also induced in the cable sheath and in the other cable conductors if such are present, and these potentials exist in decreasing magnitude for some distance back along the cable. *Fig. 3* shows an example of the potentials existing along a cable for a particular size and length of cable and for a unit of input surge current.

To cause a permanent trouble in cable conductors, two things are required. First, there must be sufficient difference of potential between wires or wire and sheath to cause dielectric failure of the insulation. Secondly, there must be sufficient current in the arc to "burn the trouble in." For the more common wave shapes encountered in actual practice, currents with crests greater than about 1,000 amperes are sufficient to cause permanent troubles.

Mr. Phelps is with the Bell Telephone Laboratories. He presented this paper at The Fourth Annual Signal Corps Wire and Cable Symposium in December, 1955.

From *Fig. 1*, it can be seen that such surge currents constitute some 35 per cent of all surges at open-wire junctions with cable. It is, therefore, necessary to hold the potential differences between pairs and between pairs and sheath to below the breakdown value of the insulation, if troubles are to be avoided.

The potential difference between the cable sheath and the cable conductors that connect to the open wire can be reduced to a safe level through the use of carbon block protector gaps which are placed between the conductors and the sheath. This, however, may not sufficiently reduce the potential differences between the energized conductors and any other conductors in the cable.

If the cable is small, which is the most likely condition if the open wire is an extension of the cable, it is then practicable to place protector blocks between all of the cable conductors and the cable sheath. This will allow the potential at the junction to rise with respect to remote ground, but it will minimize the potential differences between the various parts of the cable caused by surge currents arriving over the open-wire conductors. The magnitude of the potential rise at the junction with respect to remote ground may be reduced by bonding the cable sheath at the junction to a low impedance ground.

If the open wire is so very severely exposed that many of the lightning surges result in permanently grounded protector blocks at the junction, additional protection (often called auxiliary or buffer protection) may be added out on the open-wire lead to divert a part of the surge current before it reaches the cable. This obviously requires a low impedance ground at the auxiliary protection point and becomes impractical in areas of rocky, high resistivity soil, or where a power system multi-grounded neutral conductor of low impedance is not close at hand.

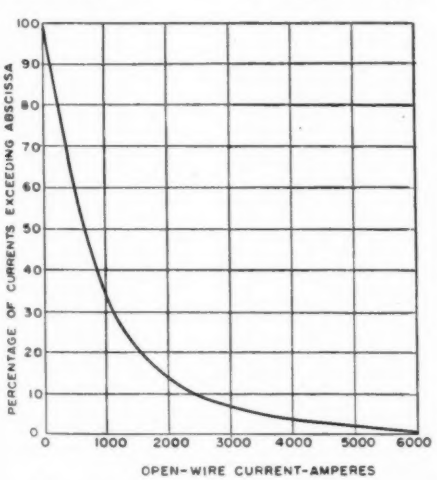

Fig. 1. Crest current distribution for lightning currents at exchange cable open-wire junctions.

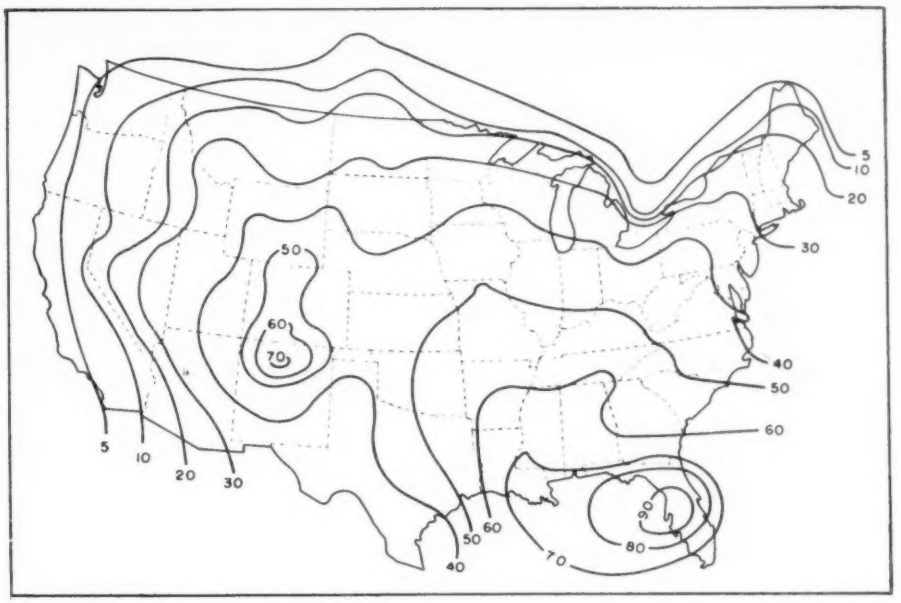

Fig. 2. Average annual thunderstorm—day activity—U. S. Weather Bureau—1904 to 1933.

In actual practice, the voltage equalization achieved through the use of "full cable-count protection" (as the scheme of protector blocks on all cable pairs is called) is not maintained throughout the length of the cable due to the fact that there almost always are grounds on the conductors at various points along the cable.

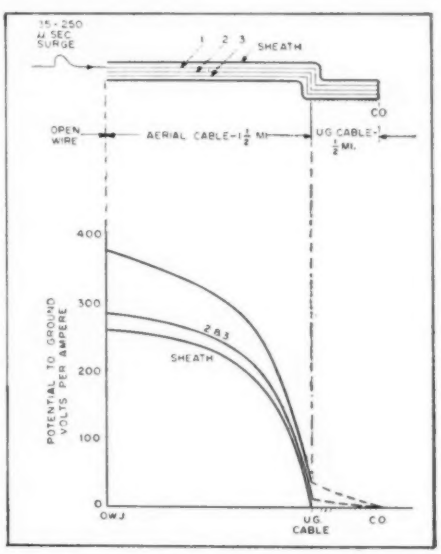

Fig. 3. Potential distribution in unprotected aerial exchange cable due to surges entering conductor.

Fig. 4 is a simplified example of the above, in which two cable pairs are attached to 20-ohm grounds at intervals along the cable between two protected points. Such would be the case if the cable pairs were connected to drop wire runs, which are effectively grounded at the station protector under surge conditions. Furthermore, one or more pairs of open wire might tap onto the cable at an intermediate point.

In order to obtain adequate protection along the cable it may be necessary to place protection at these intermediate drop wire or open-wire taps, either on the pairs involved or sometimes on all pairs. Unfortunately, the use of protection on all pairs is practical only for smaller sized cables. For larger cables, it is often necessary to use surge diverting techniques on the open-wire extensions, or to lay out the cable pair count so that the cable pairs are protected in groups at points adjacent to the point of exposure.

When cables are supported on poles which also carry power conductors, it

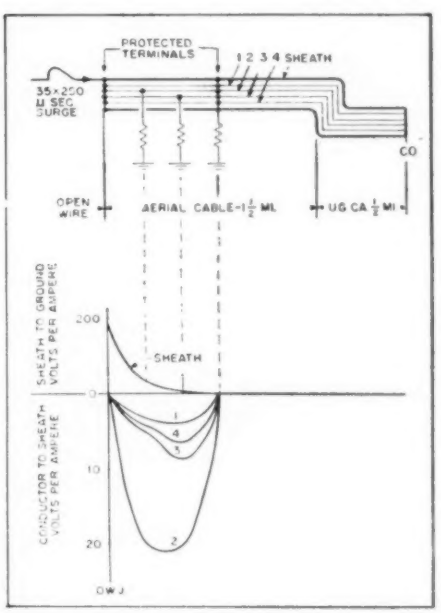

Fig. 4. Potential distribution in aerial exchange cable due to surges from open-wire lines.

is often desirable to bond the cable sheath to the power system neutral wire, thereby assuring a low impedance path to ground for the power system in the event of contact between a power phase wire and the cable.

The low impedance limits the cable potential rise at the point of contact and promotes prompt de-energization of the power supply, which, in turn, limits the damage to the cable. Bonding of the cable sheath to the neutral wire also provides supplementary paths over which lightning surge currents may be dissipated. However, such bonding, to be effective, must be coordinated properly with the overall protection scheme.

Protection of Polyethylene-Sheathed Paper-Insulated Cables

Polyethylene has been used in the sheaths of three types of distribution cable in the Bell System to date. These types are Alpeth, Stalpeth and Polyethylene jacketed cables.

The Alpeth and Stalpeth cables have outer jackets of polyethylene over corrugated layers of aluminum and steel plus aluminum, respectively.

The Polyethylene jacketed cable has an outer jacket of polyethylene over a lead sheathed cable with a reduced thickness of lead. The latter type is used principally in conduit systems where corrosion mitigation is necessary. All three types are available with conventional paper insulated cores.

The inner metallic jacket in each type, necessitated by both noise and protection requirements, is of higher resistance per unit length than the same size lead sheath cable, except for Alpeth cables of less than 0.7 inch in diameter which have lower resistance sheaths than lead. However, the magnitude of the difference is quite small for small cables and becomes of appreciable size only for very large cables. Since these larger sizes are almost always used in more compactly built up areas where the exposure to lightning surge currents is lower, the increased sheath resistance is of small consequence.

Conversely, the smaller sized cables are more often found in suburban and rural areas, where the lightning exposure is more severe, and where their lower sheath resistance affords greater protection. For the foregoing reasons, the protection practices outlined for paper-insulated lead-sheathed cables may be applied with comparable results directly to cables with polyethylene sheaths.

Although the dielectric strength of polyethylene sheath is sufficient to withstand breakdown between the power conductor and the inner metallic jacket in the event of contact with the great majority of power systems, it is not possible to place too great reliance on this feature. Many power contacts are not solid ones and the power conductor may slide along the cable. Consequently, the lashing wire and the supporting strand are almost certain to be energized. There will then be localized heating near the point of contact, which may cause softening of the polyethylene.

As a result, the inner metallic sheath or the sheath and conductors both may finally be energized. To limit damage in cases such as this, the strand should be well grounded, preferably to the multi-grounded neutral. Also, there should be frequent bonding between the supporting strand and the inner metallic sheath. This lowers the fault path impedance and hastens de-energization of the power system. Bonds are supplied at splices, at terminals and at loading coil points, and normally these are sufficient, but there may be special cases, such as rural cables with infrequent terminals, where additional bonds would decrease the probability of damage.

As the polyethylene between strand and inner metallic sheath has a finite dielectric strength, it is possible for lightning surge currents on the strand to build up sufficient potential difference between strand and sheath to cause breakdown of the dielectric. In general, the greater the distance between strand-to-sheath bonds, the greater the probability of sheath puncture. This is due to the fact that in the longer bond-to-bond sections, a greater percentage of the normal distribution of surge currents collected will produce sufficient IZ potential to cause puncturing.

Some tests currently in progress indicate that small aerial cables in high lightning incidence areas should have bonds no greater than 1,000 feet apart in order to keep the number of sheath punctures to an acceptable value. It is not feasible to add enough bonds to keep the cable from ever being punctured, as direct strokes to the strand will occur and these may be of sufficient magnitude to cause punctures within a short distance of a bond.

Further tests are expected to yield more precise information on the optimum spacing of bonds to minimize the combined cost of bonding and puncture repairing for the several sizes of cable.

Protection of Polyethylene Insulated Cables

The dielectric strength of the standard polyethylene insulated conductor cables used in the Bell System is a number of times greater than that of conventional paper cables. It is apparent, therefore, that many of the surge currents which made protection apparatus necessary on paper cables will cause no damage at all on polyethylene cables. For this reason, it has been decided that protection apparatus will be kept to a minimum in an effort to get realistic data on the susceptibility to damage of this type of cable, rather than to cover up data by over-protecting the cable. If experience shows that additional protection is needed for special conditions or in very high lightning incidence areas, the apparatus will be added as required.

Even with the high dielectric strength afforded by polyethylene, a number of the potentials appearing between cable—open-wire pairs and the cable sheath, due to conduction of surge currents over open-wire extensions, are of sufficient magnitude to break down the dielectric between the pairs and sheath in polyethylene cables. For this reason, protector blocks will be used on these pairs at the junction of these facilities.

It will not, however, be necessary to protect the other non-connected cable pairs at the junction, as the induced potentials between these pairs and the sheath will not in general be high enough to cause dielectric failure. Discontinuities in the potential levels along the cable at points where subscriber's drops are connected to cable pairs will also be of less consequence, as the dielectric strength of the polyethylene insulation will be high enough to withstand most of them.

This means that unprotected terminals may be more liberally used on the cable in areas where paper cables would need protection at the drop wire terminals.

When a polyethylene insulated conductor cable is connected to a paper insulated conductor cable, lightning surge currents may pass through the polyethylene cable without damaging it, yet cause troubles in the paper cable. For this reason, it may be necessary to install protection on all the paper pairs at the junction of these two types of cables. Whether or not protection will in fact be applied at such junctions depends on the length and exposure of the polyethylene cable and the type of service supplied by the paper cable.

An additional safety factor is inherent in the use of polyethylene insulated conductor cables on higher voltage joint-use lines. In the event of contact between a power phase wire and the cable, the higher dielectric strength of the polyethylene conductor insulation will reduce the possibility of conductor energization due to dielectric failure. There will be a consequent

(Please turn to page 47)

Operation of Telephone Party Lines

By **A. W. BAERRESEN**

THIS IS the second and last installment of this article on this most important phase of telephony. The first part was published on page 20 of the Aug. 25 issue.

Comments on Party Line Service

Party line telephone service has long been tolerated in the United States as contrasted with the countries of Europe, where practically all telephone service is on an individual line basis. Party line service was considered as an economic necessity in the United States when stations were fewer and at greater average distances from central offices than is now the case, and when most of the outside plant was in open wire.

Because of the reduced investment required to serve a given number of stations by means of party lines, many telephone managements have pushed party line service, particularly four-party and it has been generally accepted. This has been true of many Independent company operations. With something less than the best telephone service being sold in order to keep investment in outside plant as low as possible, it was only natural that the lowest first cost central office party line arrangements would also be employed; that is, terminal-per-line equipment.

There has always been some customer dissatisfaction with party line service because of delays in obtaining use of the line when desired, and because of lost incoming calls due to excessive line busies. With a high urban development of four-party lines, the line busy rate is high, requiring many subsequent attempts to complete local and toll calls, with many calls being uncompleted. The service of all subscribers, individual and party line alike, is lowered because of the high rate of busies on lines being called.

It would seem reasonable, if the standard of living continues upward, that urban residential telephone service may become largely one and two-party; especially when plant shortages are overcome and upgrades are sold instead of being denied. It is important, then, that future possible ratios of lines to stations be carefully considered when estimating future costs of terminal-per-station equipment.

The plant economies of party line service may not be as substantial as is generally believed, especially where it is difficult to maintain high party line fills. As an example: Assume that four-party line fills are 3.0, then .333 cable pair and line equipment is used per average four-party main station. Two-party stations at a line fill of 1.7, use .588 lines so that upgrading in this case from four to two-party service requires .255 additional cable pairs. This might represent $5.10 (assuming annual charges of $17 per cable pair, and $3.00 per line equipment) in added annual plant charges or 43 cents per month. There would be some operational savings in addition to the rate differential to pay a return on such upgrading.

If four-party line fills should be as low as 2.5, then the line usage per four-party station would be .400 and the subscribers on one-half of these lines would be receiving two-party or better service. If one-half of the lines serves two stations and the other half three stations, 40 per cent of the four-party subscribers would be enjoying two-party service and 60 per cent three-party service.

CO Line Distributing Frame Arrangements

A main distributing frame (MDF) is provided in all central offices to mount the protectors (spark gaps and heat coils) and to provide a cross-connecting field between the central office equipment and the outside cable pairs. A line intermediate distributing frame (LIDF) provides a cross-connection field between the line relay equipments and the connector terminals so that any one or several connector terminals may be connected to any line equipment. Many terminal-per-line offices do not have LIDF arrangements in which case the commoned line equipment and connector multiple terminals appear on one side of the main frame. If they are terminated on the protector (vertical) side and the outside cables are terminated on blocks on the horizontal side, the frame is known as the "A" type.

This arrangement, although the main-frame jumpers are outside of the protection, has been considered desirable, since the telephone line numbers appear on the protectors, permitting opening and testing working telephone lines without looking up the cable pair numbers. Also fewer protectors are needed, since there are generally more outside cable pairs than central office line equipments.

On the other hand, many offices have the central office equipment terminated on the blocks on the horizontal side,

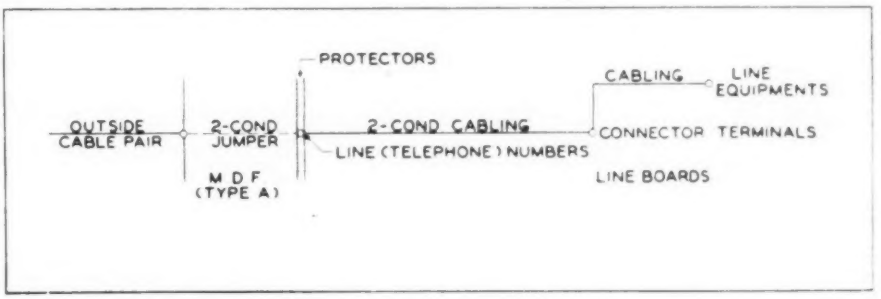

Fig. 3

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and the outside cable pairs on the protector strips, which arrangement is known as a "B" type frame. *Fig. 3* shows the arrangement of a terminal-per-line office not having a LIDF; that is, no means of cross-connecting between line equipment and connector terminals.

With a terminal-per-line office having a LIDF, and with a terminal-per-station office (which always has a LIDF or some means for cross-connection between line equipment and connector terminals), the separate line equipments and the separate connector terminals are generally terminated on opposite sides of the LIDF, and the connector terminals or the line equipments are cabled over to the MDF.

Fig. 4 shows the distributing frame arrangement of a terminal-per-station office with the line equipments at the main frame. This is the arrangement now generally used in terminal-per station offices because there are fewer line equipments than connector terminals. Therefore, fewer MDF terminal blocks and less tie-cabling between the two frames are required than if the connector terminals appeared at the MDF.

Of course, only two conductors, + and — (or tip and ring), of the line or connector terminal circuits are carried to the main frame for cross-connection (two-wire) to the outside cable pairs. A three-conductor jumper is required at the LIDF, because the private (sleeve) of the line equipment and connector terminals must be associated. Either a type "A" or "B" main frame may be used.

The arrangement with the line equipment at the main frame reduces cross-connection work when stations are connected to or disconnected from party lines, or moved between party lines, since only the station jumper at the

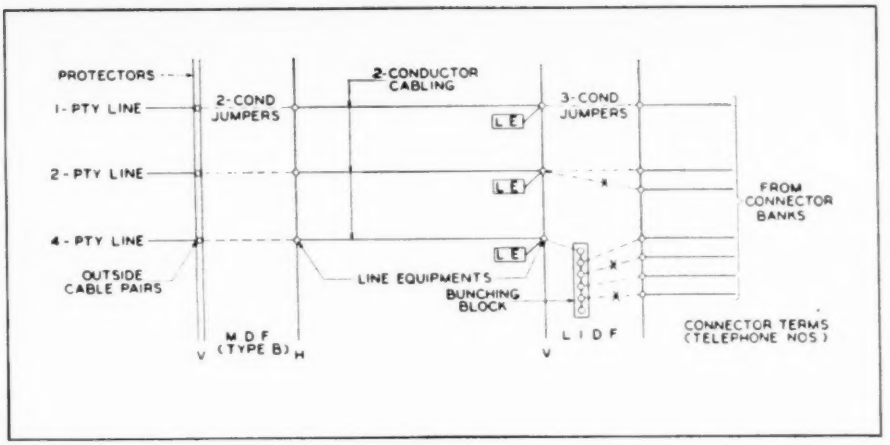

Fig. 4

LIDF need be changed. However, when moving a line from one line equipment to another for load (traffic) balancing of the originating groups, jumpers on both frames have to be changed. On the other hand, with the connector terminals at the main frame, as shown by *Fig. 5*, line group balancing is done by changing LIDF jumpers only, but party line station movement may involve both frames.

It will be seen that a Type "A" main frame in a terminal-per-station office, having the connector terminals at the MDF, would involve considerable more investment and floor space than a Type "B" frame, since protectors would be installed for the capacity in main stations plus 10 per cent against protectors for the lines plus 2 per cent.

Bunching blocks, having five or six sets of terminals (three-conductor) strapped together, are generally provided at the LIDF in terminal-per-station offices to furnish a convenient means of connecting the jumpers from the four or more terminals associated with a party line to the one line equipment. Bunching blocks are not needed for two-party lines, since the two LIDF station jumpers can be connected to one set of line equipment terminals.

Figs. 4 and *5* show the terminal-per-station cross-connecting arrangements for one, two and four-party lines.

Terminal-Per-Station Party Line Ringing Arrangements

The same party line selective ringing principles apply to both terminal-per-station and terminal-per-line equipment, with the difference, however, that with terminal-per-station operation, the ringing current selection is not done by a digit dialed into the connector to set a minor switch, but is a function of the terminal. The terminal-per-station connector is therefore simpler and cheaper than a terminal-per-line connector.

The common ringing systems are as shown in the following table:

	Number of Stations on Line Without Other Rings Being Heard	
	Bridged	Divided
Code Ringing (one frequency)	1	2
Harmonic Ringing— 4 or 5 frequencies	4 or 5	8 or 10
Superimposed— 2 polarities	2	4

These systems may be used on a bridged or divided (grounded) ringing basis. With bridged ringing, all the station ringers are connected "across" the line, and no ringing ground connection is needed at the subscriber's station. With divided ringing, half of the ringers of a party line are connected from one side of the line to ground and the other half from the other side to ground. With divided ringing, the number of stations on a line which may be selectively signaled by a given number of ringing frequencies, or by the two polarities, is doubled as compared with bridged ringing.

With terminal-per-station equipment, any connector terminal can be arranged to ring on the tip (or +) side of the line by reversing the tip and ring (+ and —) conductors of the jumper at

(Please turn to page 28)

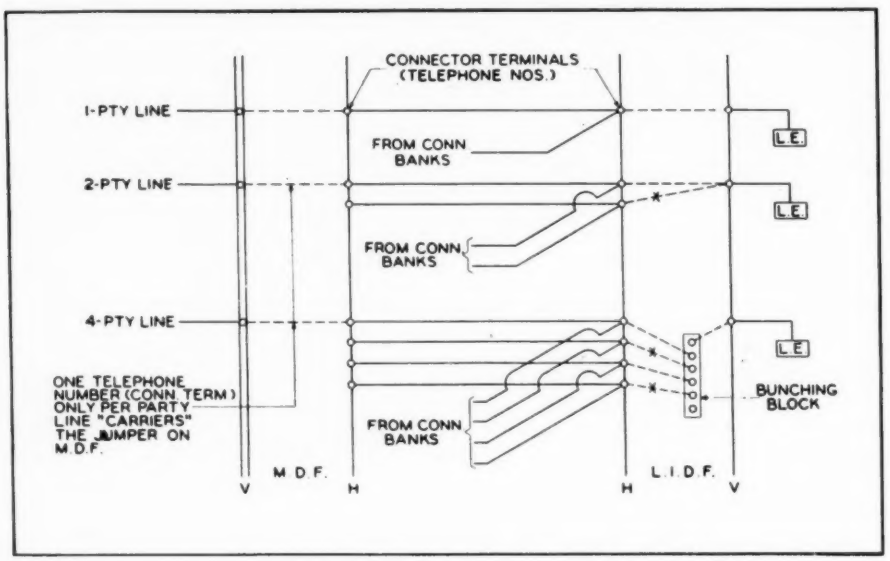

Fig. 5

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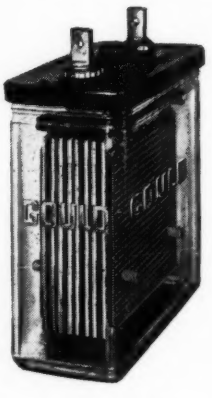

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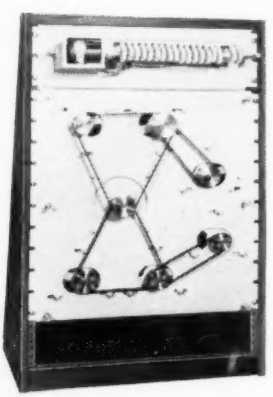

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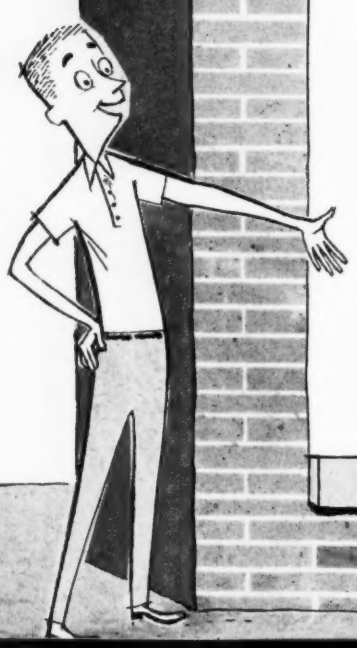

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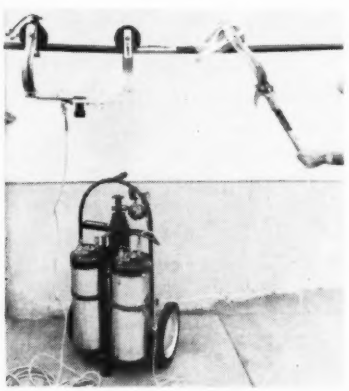

Cable Leak Detector — Two models are illustrated. Model at left is for high cables. Nozzles spray cable, air pressure from tanks causes air bubbles clearly seen from ground. S&G MFG. CORP.

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one side (horizontal) of the LIDF. If this jumper is run "straight" (not reversed) the ringing current is connected to the ring (—) side of the line. The "X" on the LIDF jumpers of *Figs. 4* and *5* denotes reversed jumpers in the case of grounded ringing.

Types of Terminal-per-Station Connectors: There are two general types of connectors for terminal - per - station party line ringing: the "straight line" and the "frequency-per-terminal." The straight line standard connector is the simplest and lowest in cost. Each straight line connector in a connector group (hundred terminals) has only one frequency, one polarity or one code of ringing current connected to it, so that all telephone numbers in the hundred terminals are signalled by the same ringing current.

Therefore, on a bridged ringing line, the associated party line numbers must be in a different hundreds, no two of which employ the same frequency, polarity or code, as the case may be. Therefore, there must be at least 100 terminals of each selection of ringing current installed in an office, and except for larger offices an equal number of groups of each. With divided ringing, two stations on a line can have numbers in the same hundred provided their ringers are on opposite sides of the line.

The frequency-per-terminal connector employs a four-wire wiper and bank. By means of a ringing control jumper connection made to this fourth wire of a connector terminal, this terminal is "marked" to ring on one of the four or five harmonic frequencies, and it will ring only that one, no matter which connector in the hundred's group is used.

Each terminal may thus be connected to ring any frequency and this connection may be changed as desired by changing the ringing control jumper. The ringing frequency is, therefore, independent of the connector hundred numbers. This system is the most flexible but involves slightly higher first and administrative costs.

Terminal-per-Station Connector Group Arrangements: With one and two-ring code ringing and using straight-line connectors, sufficient two-ring connector groups are generally provided to accommodate one-half of the expected four-party development, plus some margin for flexibility and for balancing by including some one and two-party services. One-ring groups are provided for all other stations excepting those on multi-party lines. Any one-party or any new two-party station may be assigned in a two-ring group. There is some inflexibility in this arrangement, in that it may be desired to move a present two-ring four-party station to a four-party line having two two-ring stations and one one-ring station working; that is, the existing vacancy can only be used by a one-ring number. If such a move must be made, a number change is involved.

With harmonic ringing and employing straight line connectors, the frequency - per - group (sometimes called frequency - per - shelf) arrangement is used. If five frequencies are employed, each one-fifth of the total connector hundreds may be assigned a different one of these five frequencies. With this arrangement, one and two-party stations would be scattered over all groups and all harmonic type subscribers' sets would be used. However, if an office has a high proportion of one-party stations using straight line ringers, more than an even proportion of the lower frequencies and fewer of the higher would be provided. Two-party lines could be operated on a divided basis with straight line ringers as desired. The trunk hunting groups would be assigned a low frequency.

There is also some inflexibility with the frequency-per-group arrangement. For example, it may be desired to move a 20-cycle station to a four-party line which has a 20-cycle station working, but has vacancies in other cycles. If this move must be made and the 20-cycle station already on the line cannot be moved to another line, a number change and a station ringer change are involved in order to change the moving station frequency to match an existing vacancy on the line.

With superimposed ringing, half of all connector groups are generally assigned negative and half positive ringing current, and the one, two and four-party stations are assigned throughout all the groups in order to obtain balanced connector group traffic. This arrangement gives full flexibility in two-party assignments, since any two numbers in the office can be associated on a line with divided ringing. There is some inflexibility in four-party line regrouping. For example, it may be desired to move a negative ringing station to a four-party line on which two negative stations are already working. A number change to a positive group would be necessary if one of the two negative stations on the line could not be transferred to a third line.

Experience with terminal-per-station equipment using the one ringing selection-per-group arrangement has shown that the inflexibility outlined above, actually causes very few number changes. In a large majority of cases, a station can be selected for moving, whose ring will match the vacancy to be filled. However, at times, several line transfers may be involved.

Because of the higher cost of frequency-per-terminal connectors, and the added frame and record work of maintaining the frequency control jumpers, these connectors may not prove in for the larger offices. The provision of a sufficient number of groups to accommodate all five harmonic frequencies under the frequency-per-group plan in a small office, generally requires excess terminals and connectors. Also in small offices the added flexibility of frequency-per-terminal may be more important than in larger offices.

With harmonic ringing, eight or 10 stations per line can be fully selective with terminal-per-station equipment on a divided ringing basis. With one and two-ring code and with superimposed negative and positive ringing, only four stations per line can be served on a frequency-per-group basis so that in these cases multi-party code ringing connectors are generally provided for rural lines. These special groups may be on a terminal-per-line or terminal-per-station basis.

Intercepting Arrangements

With terminal-per-station equipment, all non - working connector terminals (directory numbers) are free of all connection with lines or other terminals. It is, therefore, a simple matter to connect in multiple (strap or cross-connect) all of these terminals to one or more intercepting trunks. The most flexible arrangement employs six-point terminal blocks for the connector multiple on the LIDF, three of these terminals are the regular +, —, **c**, leads; the extra three terminals are strapped together below the blocks in groups of 50, 100, or more terminals. A three-conductor connection from each strapped common leads directly to an intercepting trunk, or through concentrating (trunk-hunting) switches to a group of intercepting trunks. In order to connect a vacated or vacant telephone number to "intercept" requires only the connection of pre-cut strap wires which are three or four inches long and which are generally placed without soldering.

If the six-point blocks are not provided, an extra terminal on each regular block or at frequent locations on the frame may be installed, so that strapping or short jumpering to these conveniently located terminals may be readily done. The number of vacated terminals which are tied together on one intercepting common is limited so as to reduce the possibilities of simultaneous calls reaching the common.

In the larger offices, if manual inter-

(Please turn to page 48)

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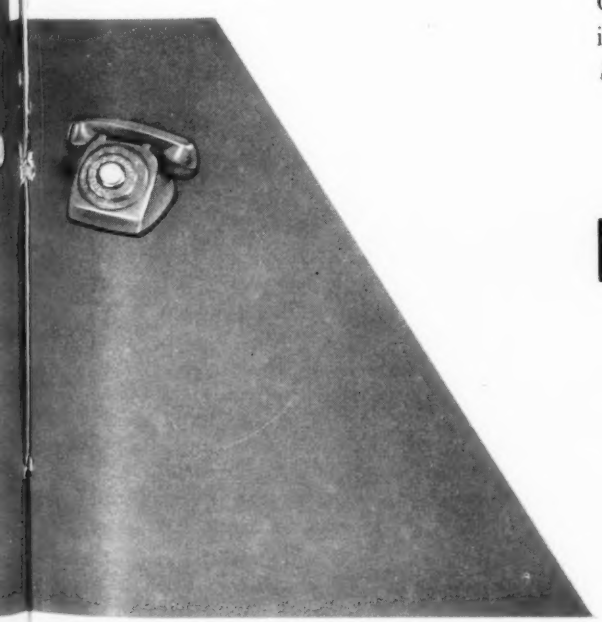

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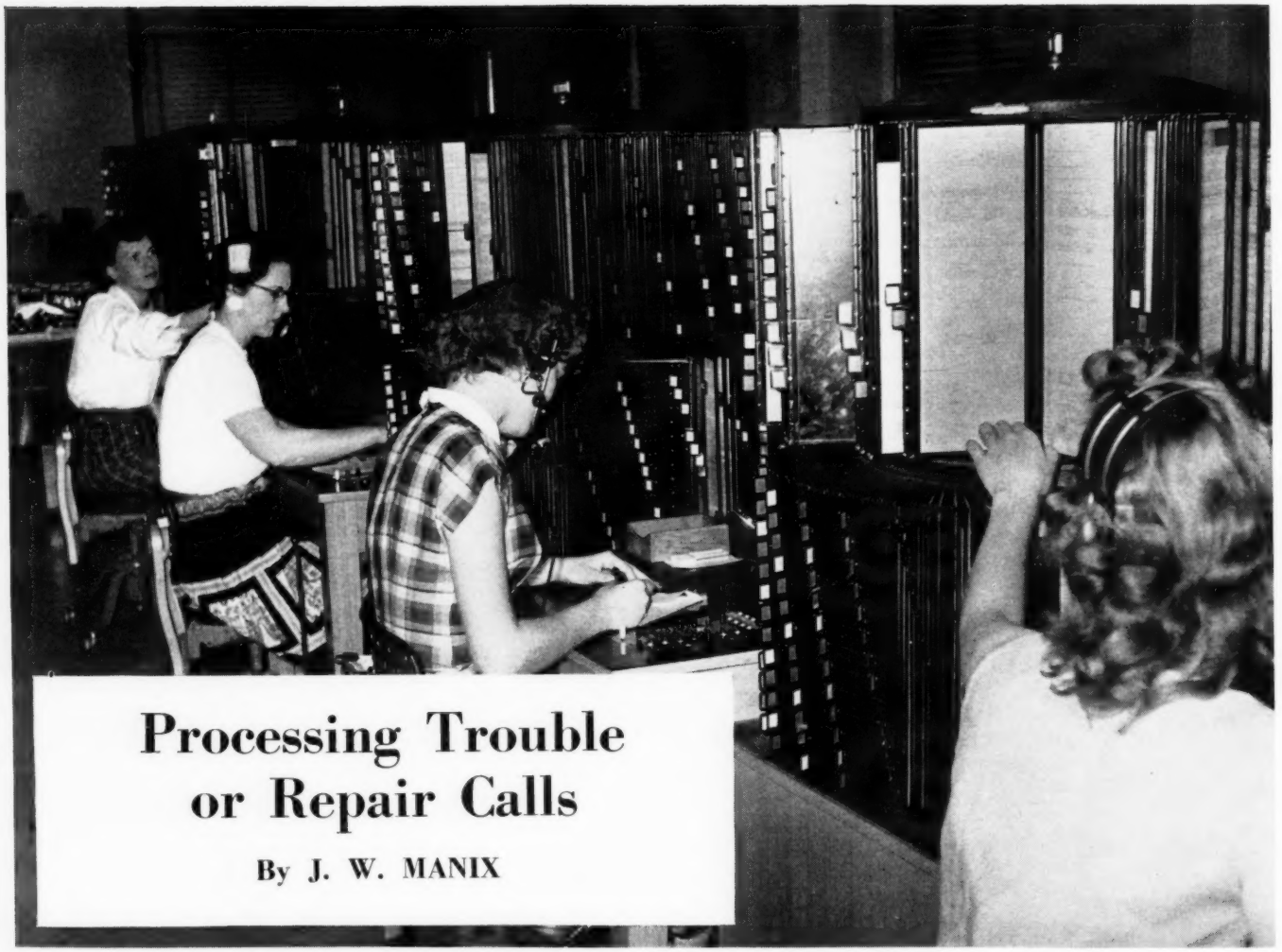

Processing Trouble or Repair Calls

By J. W. MANIX

Remington Rand Linedex rotary equipment, which houses information on 90,000 telephone subscribers, makes a wealth of data speedily available. Linedex inserts contain telephone number, name of owner and street address; the color of the insert instantly reveals a party line, private line, or temporarily disconnected line. Colored signal attached to inserts indicates a line out of order, grounded, or suspended for nonpayment.

PERHAPS the biggest headache in the operation of a metropolitan telephone system is the processing of trouble or repair calls. Telephone systems are complicated mechanisms, and things go wrong on occasion. The more lines and telephones, the more trouble can be expected.

Peninsular Telephone Co. has 90,000 telephones serviced by the headquarters exchange in Tampa, Fla. It is not unusual for us to receive 500 to 800 repair calls each working day. During storms, the total may leap to from 1,500 to 2,000.

Our continued growth in the Tampa area necessitated a move to larger quarters in 1954. At the same time, we decided to improve our system for handling repair calls.

We had been using a vertical card file. After receiving a trouble call, the operator had to thumb through the cards to find the information she needed. The job was handled adequately when the exchange was smaller, but as thousands of new telephones were added repair calls increased beyond satisfactory control.

For one thing, only four operators could handle trouble calls at one time. When they became unusually heavy, especially in bad weather, the girls were unable to handle the volume because of the time required for checking. This, in turn, did not contribute to the high level of customer relations and good will which are essential to a telephone company.

There were other complications. The old cards were made out by telephone line, and lines some times include more than one telephone. If one telephone was reported dead, the card had to be pulled, pending a test board check. Then, if another telephone on the same line reported dead, the operator was obliged to go looking for the card, wasting precious time.

We examined several methods for solving this problem. After a good deal of study we decided on Remington Rand's Linedex rotary equipment.

We now have eight operators and one supervisor working staggered shifts, from 7:30 a.m. until 9 p.m. This enables us to have five girls answering calls at all times. When one of them receives a complaint, she checks to find if the line is in service and the type of line it is. She needs the telephone number, owner's name and street address. As the person calling in the complaint is often not the subscriber of the telephone, the operator is not always supplied this information.

To make such immediate checks possible, we have five Linedex double-tier rotaries. Each group of twin rotaries contains 90,000 inserts covering our entire exchange. The operators are positioned so that the desired information is at less than arm's length.

Given a telephone number, the operator quickly checks by finding the

(Please turn to page 50)

Mr. Manix is construction superintendent of the Peninsular Telephone Co. of Tampa, Fla.

Section 19 (Continued)

(16) *Failure to Furnish the Telephone Number on Outgoing Calls.* Furnishing the called number speeds the call to conclusion. It keeps operating and expensive circuit time at a minimum. It prevents inefficient use of equipment.

CAUSE A. *Extension users do not consult directories or list of telephone numbers frequently called.*

CORRECTION—Check with extension users and if necessary, help them compile list of frequently called numbers. Encourage them to compile such lists and maintain them.

CAUSE B. *Poor condition of record.*

CORRECTION—Each time the attendant hears of a change in the numbers on the extension users' lists, she should inform him of the change.

(17) *Slow Disconnects.* They result in inefficient use of equipment. They sometimes add to the cost of toll calls. They produce false busy tests in the central office.

CAUSE A. *Inattention.*

CORRECTION—Check ventilation, heat and lighting conditions. Does attendant have personal calls over her switchboard? Explain the dangers of such calls.

CAUSE B. *Eyes off board unnecessarily.*

CORRECTION—See that attendant knows proper way of taking and leaving position. Are references within easy view of attendant? Is she naturally curious as to what is going on about her? Explain the need for constant vigilance if a good grade of service is to be maintained.

CAUSE C. *Failure to overlap properly.*

CORRECTION—Develop attendant's ability to overlap and use "waiting" intervals to advantage. Any action that would delay the call is not an overlap operation.

CAUSE D. *Allowing signals to be hidden by hands, tickets or other material.*

CORRECTION—See that attendant keeps her hands away from cord lamps when not putting up or taking down a connection. See that tickets are of proper size and that ticket holders or ticket bins are installed where needed. See that all material not required in the operation of the board is kept off the keyshelf. Has attendant a suitable place for pocketbook?

CAUSE E. *Dim cord signals.*

CORRECTION—Report any dim signals to the "Repair Service." Does overhead lighting cause signals to appear dim?

CAUSE F. *Improper use of buzzer key.*

CORRECTION—Does attendant keep buzzer key operated whether traffic is heavy or light? Does she have buzzer key on at all times when she has other work to do?

CAUSE G. *Poor location or condition of records.*

CORRECTION—Are all records used by attendant accurate, complete, legible and up to date? Are the records conveniently located and easily usable?

CAUSE H. *Failure to identify disconnect signals.*

CORRECTION—Does attendant rotate cords? Does she use key sleeves?

Section 20
The Importance of Group Meetings

Group meetings have many purposes, the most important of which is to improve relations through gaining the confidence and good-will of those attending. Such meetings usually promote cooperation and a desire to attain objectives for which the meeting is held.

Group meetings attended by both PBX management and attendants are exceptionally effective in bringing about a pleasing, efficient service—a product beneficial to telephone company and private branch exchange customer alike.

Some PBX's are as large as medium-sized central offices and have the same problems and the same need for close supervision. The correct operation of a PBX has a direct influence on the general character of the over-all central office services.

Dial service is being extended rapidly and as a result, telephone users encounter central office operators less and less frequently and deal proportionately more often with PBX attendants. Consequently, the telephone company's responsibility in developing the attendants' service attitude is constantly becoming more important if we are to continue to hold public esteem and approval.

The accomplishment of PBX objectives depends almost entirely upon the telephone company's sincere desire to assist its PBX customers.

PBX conferences or group meetings between the Service Adviser and PBX customer management and attendant give an over-all picture of the PBX

service for the entire community by bringing together attendants and management folks from every kind of industry serving the community. When these people meet and bring their telephone problems out into the open for discussion, benefit belongs to everyone attending the meeting.

PBX group meetings work toward achievement of good over-all service in the following ways:

(1) Keep attendants and management informed on new practices and development.

(2) If questions are raised by PBX attendants or management persons it can be taken for granted that they are inquiring about matters which interest them and, generally, items that are puzzling to one PBX have their counterpart at other PBX's. Usually the answers that work for improvement for one PBX have general application and will be of benefit to many.

(3) Have a distinct value in building and maintaining good public relations by letting the customer know the telephone company is interested in the service that goes over his PBX system.

(4) Build the right service attitudes and show our sincerity of purpose and the close relationship that should exist between the telephone company and its customers.

(5) The success of any meeting depends almost entirely upon how eager and able the PBX attendants and customer management people are to use the meeting to discover what they want to know about improvement of their PBX service.

(6) The responsibility and motivation for requiring knowledge belong to those attending the meeting. It really is their meeting and not the Service Adviser's. The effort must stem from the PBX folks, if interest and motivation for learning is to be present. Even so, the Service Adviser will have to nudge certain participants into raising questions, if the meeting is to remain open to all attending.

(7) The Service Adviser must be prepared for all eventualities. The attendant's development and requisition of knowledge depends on how well she can, and how far she is permitted to, examine the person in charge of the meeting.

(Section 20 to be continued next week)

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITOR

THE PRESS reports that "dial-a-message" telephone prayer service, started in Cincinnati on May 17 by the Walnut Hills-Avondale Methodist Church is to be discontinued as the telephone equipment available cannot handle the service load. Callers to a number at the church automatically heard a recorded prayer.

The telephone company reported that on some days there were 4,000 to 5,000 overflow calls on this number. It is also estimated that between 3500 and 4,000 calls were completed each day.

When the service was started one line was used. Later, a second and then a third were added.

The only way this tremendous traffic load can be handled would be to provide special equipment, the rental of which would cost $1,000 per month, or more. This the church cannot afford; hence, the service is to be discontinued.

There appears to be a tremendous requirement for some type of "dial-a-prayer" service everywhere. The demand has been heavy in each location where it has been tried to date.

Perhaps someday some one will devise a method to satisfactorily finance this worthy service. It may even be possible for all churches in each city or town to unite in this effort to furnish recorded prayers for all faiths.

•

The installation of carrier repeater equipment in weatherproof pole mounted cabinets is now standard practice. With compact construction and low power requirements made possible by transistorized equipment, this practice is certain to increase in the future. It appears highly probable that at some time in the future complete telephone exchanges may be pole mounted.

•

The new plastic tapes, when properly used, actually do a wonderful job of moisture-proofing splices in wire and cable. An aluminum tape with an adhesive backing provides a good weathering surface for the splice.

It is a peculiar thing though that few people are willing to trust a taped splice except on a temporary basis. Perhaps this prejudice is a carryover from the old days when temporary cable repairs were often made with rubber and friction tape. It is difficult to make people realize that there have been a lot of improvements made in tape in recent years.

•

The amount of communication required in a modern hospital is rather astounding. In addition to the normal telephone service, there are radio and television receivers for entertainment purposes. There are also audio-visual nurses call systems that are presently being installed in most modern hospitals. The central dictation system is proving its worth as doctors can grab a microphone and dictate a patient's record with practically no lost time. Added to this, some type of paging system is generally required.

The provision of wiring for this special and large communication system presents numerous problems if it is not properly planned.

When a new hospital is being planned in the territory of any operating company, the authorities will save many headaches by conferring with the architect to make certain that an ample conduit system is provided as a part of the building's structure.

•

We have noted frequently of late the cryptic abbreviation "Tel. Qual." stamped on some component parts, but we didn't know what it meant until recently. Now we have been informed that "Telephone Quality" signifies a higher degree of reliability than the customary JAN or MIL specifications for equivalent field service.

It is flattering indeed to learn that our industry has been striving for, and has attained, higher reliability than the military.

•

We are advised by Bill Gold, of the *Washington* (D.C.) *Post*, that the quickest way to make a man angry is to misspell his name. He goes further to explain how cub reporters frequently get into trouble early in their careers by misspelling names. Just when he decides that the telephone directory is a fine reference work because the telephone company's proofreaders are so careful and painstaking, the poor cub realizes that the telephone directory contains many intentional errors.

This we did not know until now, but it is nevertheless a fact. A businessman with a name that can be spelled several ways doesn't want to miss any business just because his customers aren't familiar with his own choice of spelling. This would be true of a name such as Cohen which may be spelled Kohen, Cohn or Kohn. So Charlie Kohen, the stamp and coin dealer in Washington, D.C., is listed in the telephone directory as "Cohen, Chas." as well as "Kohen, Chas." Then the "Hechinger Co. Building Materials" is also listed as "Heckinger Co. Building Materials."

•

The Videotape Recorder is now available to record television programs magnetically. This recording can be played back instantly without processing, and more than an hour's program can be recorded on a single reel of tape. This tape may be erased and reused about 100 times.

•

It is reported that during 1955 the Soviet Union used 40 per cent of the speaking time in the United Nations, while the United States used only 4 per cent. And we claim that we are a nation of talkers!

XUM

EXIDE-MANCHEX BATTERIES

Continuous and emergency power for telephone systems

Reserve lead supply in spiral buttons keeps battery young

TELEPHONE BATTERY. Exide-Manchex Batteries are available in a wide range of capacities from 8 to 960 ampere hours. Compact construction saves space and weight. Flat cover easy to clean. Write for Bulletin No. 4852.

Long after most other types of batteries turn up their toes and die, Exide-Manchex Batteries used in floating service applications are still going strong. And they keep on going strong for years and years.

The reason can be found in their unique construction. Exide engineers have cut through the center of an Exide-Manchex positive plate and photographed the results shown above. Under the outer layer of active material on the spiral buttons you can see a shiny core of reserve lead. During the life of the battery, this lead turns slowly to active material as it is needed. Yet the inactive metal grid never, never weakens; always retains its shape; holds the buttons firmly in place. Hence battery life is prolonged.

Only Exide-Manchex Batteries offer this extra assurance of long battery life. When you order batteries for floating service applications—whether with new equipment or for replacement—be sure to specify Exide-Manchex. For information, call the Exide sales office near you. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

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The three advertisements across the page are from the current campaign urging people to use the "Yellow Pages" to find out where to buy the things they need. This cheerful series is appearing in 17 leading national magazines read by millions everywhere. Promoting greater use of the "Yellow Pages" promotes more business for "Yellow Pages" advertisers and for all of America's telephone companies.

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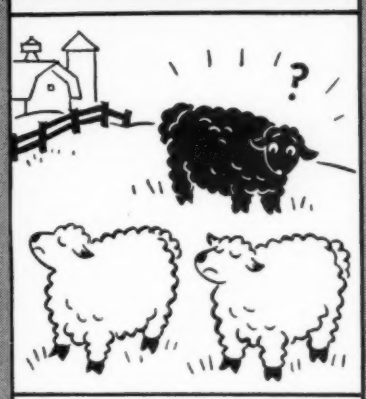

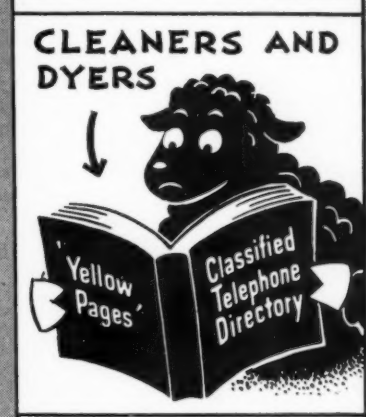

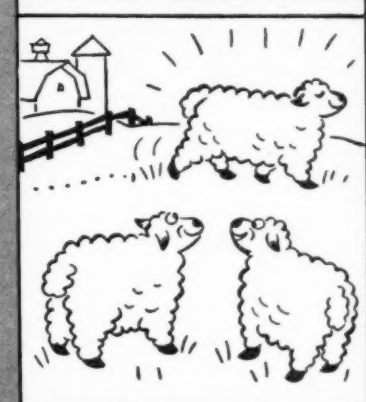

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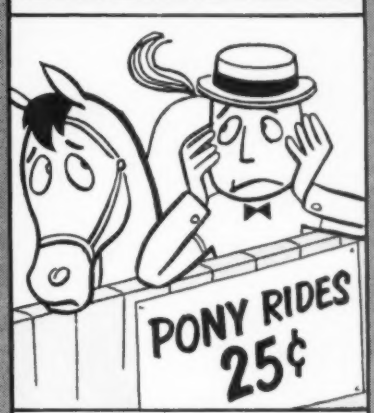

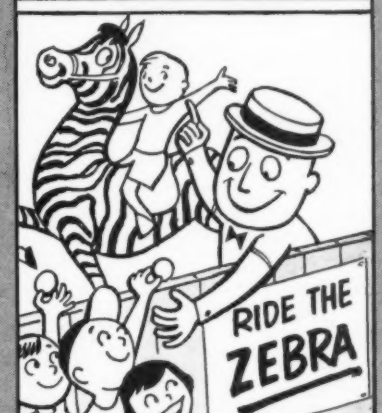

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Published every week to help you get the most out of your materials and supplies dollar

by C. J. Reynolds, Stromberg-Carlson Company

Two dividends are yours when you order supplies from Stromberg-Carlson. First, you get the protection of a double guarantee—ours and the maker's. This assures you of getting the finest products, backed by our 62-year reputation. Second, your support is used to further the art of telephony. We're knee-deep in this industry as a full-time job, not a side line, and your supply business plays a big part and helps us continue our research for new and better telephone equipment.

Cane-seat chair keeps operators cool, comfortable

Making the operator as comfortable as possible may not strike you as a "maintenance" problem – yet your service is much smoother when the girls are cool and relaxed.

This operator's chair has a cane seat, which is much cooler, cleaner and more comfortable than other types. It retains all the posture advantages for which Sturgis is famed. It is called the Sturgis SC-240.

The posture-curved, well-cushioned backrest is covered in genuine leather.

The exclusive Sturgis "Follow-Flex" feature automatically adjusts to the operator's every movement, supports her restfully all the time, discourages fatigue, keeps her at top efficiency.

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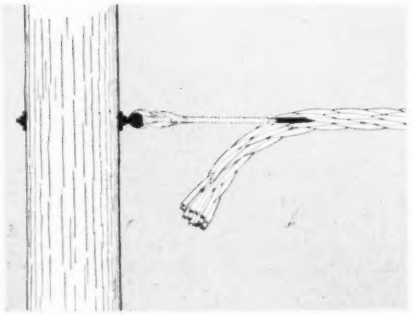
Fast delivery available from your Stromberg-Carlson representative.

These dead-ends need no bolts

Your most inexperienced lineman, using the Preformed Dead-End, can make dead-ends faster and easier than an old hand using old-fashioned dead-ends.

No bolts, no special tools are needed. You eliminate costly loops, and your dead-end exceeds the strength of the wire or cable, even under sudden impact. It never relaxes its grip.



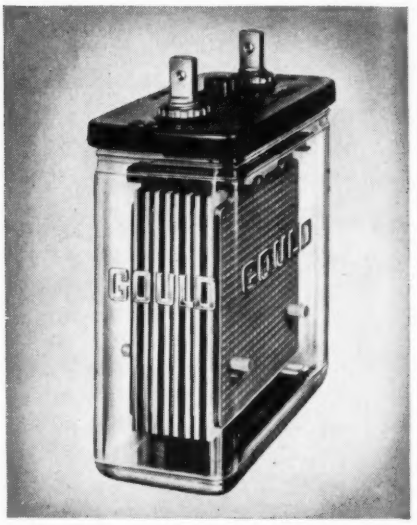
Available in galvanized steel, copperweld, stainless steel and bronze.

The Preformed Dead-End can be applied around an insulator, or inserted through thimble eye.

Available for self-supporting plastic cable, telephone line wires, rural distribution cable, and open wire.

Battery has lowest yearly cost

There's an easy way to save money on switchgear, signal and alarm systems or emergency light and power applications.



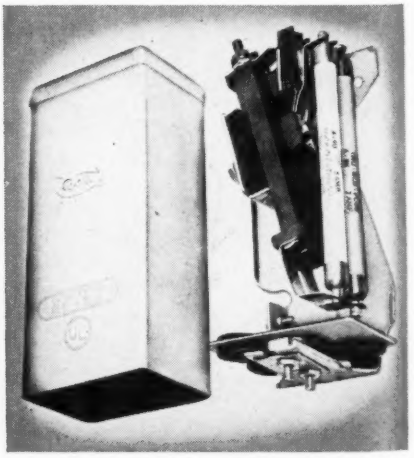
Gould Planté rolls up excellent service records—cuts maintenance to a minimum.

Amazing service records have proved that Gould Planté batteries have the lowest yearly cost of any battery you can use. Pure lead positive plates help make this possible.

For top operating economy, ask your Stromberg-Carlson representative for Gould Planté—the Aristocrat of Stationary Batteries.

The Cook RO-9U sub-station protector

Protection plus—that's Cook Electric Company's type RO-9U substation protector.



The most highly protective substation protector available.

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This rugged unit consists of a heavy Bakelite base, two 7-amp. ceramic fuses, two famous Tru-Gap dischargers and two secondary dischargers which will ground a fault current when the fuses blow. These are all mounted on a sturdy steel bracket and covered with a heavy gauge, weathertight, zinc hood.

For the best in fused sub-station protectors, order the RO-9U.

Ringing panel uses only 360 watts

The full-load power consumption of the AC Ringing Panel shown here is only 360 watts, regardless of output frequencies.

This low power consumption allows the machine to operate continuously without excessive operating costs.

New ringing panel — either AC or DC driven.

The new Holtzer-Cabot 25 Watt Multi-Frequency Ringing Panel is available either AC or DC driven for all the standard frequencies—harmonic, synchromonic, or decimonic.

Since the generated frequencies of the primary and standby machines have identical wave-shapes, ringers adjusted to the primary unit will ring equally as well on the standby unit.

Available as optional equipment are AC and DC motor-driven interruptors, and tone generators for dial and busy tone and ring-back tone.

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Plant Man's QUIZ

BY RAY BLAIN, TECHNICAL EDITOR

Q. What method is recommended for the protection of a splice in tape-armored buried cable in a section of the country where gopher damage may be expected?

A. The cable should first be spliced in the normal manner. The steel tapes should be bonded together at each end and soldered to the sleeve. The splice and the exposed sheath should be covered with rubber and friction tape or one of the new plastic tapes now available.

One method of protecting the splice from rodents is to cover it with a piece of brass wire cloth. This protection should be at least 6 inches longer than the taped area and 2 inches wider than its circumference.

The wire cloth should be neatly formed around the splice and held in place by a wrapping of tape. This is followed by a continuous spiral of lashing wire.

Some companies then lash the splice to a length of creosoted plank to provide extra protection.

•

Q. Has it been definitely determined that the wrapped, solderless connection can be successfully used on telephone equipment?

A. While this method has not been extensively used in the Independent telephone field we believe that it has proved entirely satisfactory. It has been definitely determined that by wrapping the wire under tension around a properly shaped terminal, the need for soldering may be eliminated. With this method, major economies are possible and troubles caused by splashed solder are eliminated.

We are reliably informed that if the electrical resistance of a pressure joint is to remain constant for a long period of time its contact area must remain constant, but not necessarily the contact force. It is claimed that when the metal particles are tightly interlocked, a reduction in contact force within fairly wide limits will not change the electrical resistance. The resistance will increase only when the force is reduced to such a low value that vibration and handling will cause partial separation of the contact area. In this case, the resistance is increased due to corrosion in the contact area, or the area of contact may be reduced by dislodging some of the contacting particles.

•

Q. Please explain the operation of the new radio paging systems which we understand are now available.

A. One paging system now available consists of two basic components, the encoder-transmitter which transmits the coded signal, and the receiver which indicates when it has been signalled by emitting a pleasant audible tone. The person carrying the receiver then calls a predetermined telephone number or the operator for instructions. This system provides instantaneous contact with individuals over areas up to several square miles. Larger systems can be engineered to provide service throughout entire metropolitan areas.

The receiver, about the size of a package of cigarettes, is battery operated and has no external wires or attachments. It is silent until a proper coded signal is received. This receiver at the present time is designed for use on systems having as many as 64 subscribers.

Selective coding for this paging system is accomplished by means of a series of audio tone pulses. These pulses may be one of nine different audio frequencies, covering a range of 160 to 302 cycles per second. A coded signal consists of two pulse modulated RF signals transmitted in proper sequence and corresponding to the frequencies of the two reeds in the receiver being paged. The duration of each transmitted pulse is approximately one second and the two consecutive pulses are transmitted approximately every 20 seconds until the called party answers the page. Amplitude modulation is utilized for the transmission of these audio tones.

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Courts and Commissions

Nebraska Commission OKs Purchases, Rate Changes

The Boyd County Telephone Co., Lynch, was authorized on July 17 by the Nebraska Railway Commission to purchase the properties of the Farm & Home Telephone Co., Naper, the Home Telephone Co., Lynch, and the Verdel Community Telephone Co., (TELEPHONY, June 16, p. 32).

The order also constituted a certificate of convenience and necessity for the Boyd County company to operate in this area as defined by boundary maps filed with the commission.

Service in the area will be converted to automatic operation with new rates to become effective with dates of conversion. The company will finance the improvement program through a loan of $445,000 with the Rural Electrification Administration. It is also authorized to issue and sell 10,000 shares of capital stock in the amount of $100,000 to consist of 6,000 shares of common stock at a par value of $10 per share and 4,000 shares of preferred stock at par value of $10 per share.

The following rates are authorized when dial service is in operation:

One-party business	$8.25
Two-party business	7.15
Four-party business	6.75
One-party residence	5.50
Two-party residence	5.00
Four-party residence	4.50
Rural	5.00

Minnesota Commission OKs Rate Increases, Two Sales

The Minnesota Railroad & Warehouse Commission on Aug. 20 authorized the following:

Sale of the Stoneham Telephone Co., Maynard, operating four stations, to the Citizens Telephone Co.

Sale of the Maple Grove Rural Telephone Co., Crow Wing County, operating 15 stations, to Crow Wing Cooperative Rural Telephone Co., Brainerd.

The Chisago company, now serving some 217 local and 355 rural stations, has made commitments to purchase the Stacy Telephone Exchange, to establish service through a proposed automatic switchboard to be located at Wyoming and to convert its Chisago City exchange to automatic operation, upon completion of which, it will be serving about 403 local and 550 rural stations. The company was granted rates to be effective upon completion of these changes, which will raise operating revenues from $20,641 to $57,256, and net income from $911 to $15,704, a new rate of return of 4.32 per cent on a plant the fair value of which will be raised from $40,890 to $363,400.

Prior to the cut-over to dial service, interim rates were approved which would give these operating figures: net operating revenue of $25,365; net income, $2,356; fair value, $40,890, and a 5.76 per cent ratio of net income to fair value.

The Kalevala Cooperative Telephone Association, Kettle River, was authorized to place in effect rates which would raise operating revenues from $3,063 to $4,329 and net income from a deficit of $151 to $318, a new rate of return of 5.08 per cent on a plant the original cost of which was $5,500. Rates as authorized are:

	Old	*New*
One-party business	$5.00	$6.00
Two-party business	2.00	3.00
Four-party business	1.55	2.50
Multi-party business	1.30	2.30
One-party residence	—	3.50
Two-party residence	1.75	2.75
Rural multi-party	1.25	2.25

Applications Filed in Mo. For Sale, Rates, Financing

The following applications were recently filed before the Missouri Public Service Commission:

That of J. W. Spake, to purchase the exchange at Summersville from Mrs. John F. King. Filed Aug. 13.

R. L. Arey, owner of Clover Leaf Telephone Co., Polo, for authority for a new rate schedule. Filed Aug. 16.

La Plata Telephone Co., to issue mortgage notes in the sum of $200,000 to General Dynamics Corp. through its Stromberg-Carlson Division. Filed Aug. 20.

Miller Telephone Co., to issue mortgage notes in the sum of $78,000 to General Dynamics Corp., through Stromberg-Carlson. Filed Aug. 20.

Avilla Telephone System Inc., authority for a rate schedule. Filed Aug. 20.

Stover Telephone Corp., to issue 400 shares of 5 per cent cumulative pre-

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Murphy "ONE-MAN" Cable Tester

MODEL TTB

MODEL CMUW

ONE MAN WORKING ALONE

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Combined in this "Package Plan" are Lenkurt's "Engineer, Furnish and Install" Service and Automatic Electric's "Follow-Thru" Engineering. Together, these services are all that's required to handle your job—and do it economically.

SPECIFICALLY, HERE'S WHAT WE DO—

Analyze Your Needs. Automatic Electric's "Follow-Thru" engineers study your communications problem and give you a complete over-all plan. If rearrangements are necessary in your present equipment, outside plant, or circuit layout, the most economical way is suggested. The correct carrier equipment for each specific part of the plan is recommended—*and you are told why.* The resulting circuits will function as an integral part of your over-all operations—not as an accessory that is "grafted on" as an afterthought.

Engineer, Furnish, and Install. Each carrier system is engineered to your requirements, pre-assembled, wired and tested by Lenkurt, using the most modern and precise techniques. Lenkurt "E F & I" technicians handle all the details of installation and turn the system over to you, ready to "cut over" for service on the promised date.

Train to Operate and Maintain. Lenkurt engineers will train your men to operate Lenkurt equipment right on the job. They furnish detailed equipment bulletins, line-up and operating instructions, and maintenance techniques.

"Follow-Thru" Engineering always available. Automatic Electric's "Follow-Thru" Engineering Service does not stop with the planning stage, or even with the cut-over; it is available *throughout the life of your Lenkurt Carrier.*

A letter or call will bring an Automatic Electric carrier engineer with all the facts on our "Package Plan". *Write or call* Automatic Electric Sales Corporation, 1033 West Van Buren Street, (HAymarket 1-4300), Chicago 7, Illinois. *In Canada:* Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

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ferred stock of the par value of $50 per share. Filed Aug. 20.

Texas T&T Gets Rate Raises For Three Exchanges

New rates for dial service were recently approved for three exchanges of the Texas Telephone & Telegraph Co., Corsicana, Tex.

On July 25, the city of Crawford approved rates for dial, and also interim rates. The Crawford exchange has 147 stations. The rates are as follows:

	Old	*Interim*	*New*
One-party business	$3.50	$5.00	$8.40
Two-party business	3.50	5.00	7.00
Four-party business	3.50	5.00	6.90
One-party residence	2.25	3.00	5.40
Two-party residence	2.25	3.00	4.50
Four-party residence	2.25	3.00	3.90

On Aug. 8 the city of Emhouse approved rates for dial service. The Emhouse exchange has 60 subscribers. The rates are as follows:

	Old	*New*
One-party business	$3.25	$8.00
Two-party business	3.25	7.00
Four-party business	—	6.50
One-party residence	2.25	5.00
Two-party residence	2.25	4.60
Four-party residence	—	4.25

On Aug. 20 the city of Josephine approved rates for dial service. The Josephine exchange has 70 subscribers. The rates are as follows:

	Old	*New*
One-party business	$6.00	$8.00
Two-party business	5.00	7.00
Four-party business	—	6.50
One-party residence	3.75	5.00
Two-party residence	3.50	4.60
Four-party residence	3.00	4.25

Since Jan. 1, 1956, the company has received approval of dial rates for 13 exchanges.

Neb. Commission OKs Rates

The Bancroft Telephone Co. was authorized on Aug. 3 by the Nebraska Railway Commission to establish a residence four-party rate of $2.50 gross and $2.25 net. Former rates for magneto and grounded line service will be discontinued when the exchange is converted to common battery service. The new rate results in a spread of 25 cents between one and two-party line service, and 50 cents between two and four-party service.

Seeks to Sell Mo. Companies

Permission of the Missouri Public Service Commission to sell the Everton Telephone Co. and the Ozark Telephone Co., Dadeville, to The Modern Telephone Co., Springfield, has been asked by Mary E. Miller, it was reported on Aug. 9.

N. C. Commission Decides Rates Set in 1953 Are Fair

The North Carolina Utilities Commission on Aug. 22 held that the rates it set in 1953 for the Carolina Telephone & Telegraph Co., Tarboro, should stand, thus removing from its docket a case that had been pending for several years (TELEPHONY, Nov. 6, 1954, p. 34).

In July 1953, the commission ruled that Carolina Telephone should be allowed to increase its exchange rates not more than $537,210 a year, declaring that this would enable it to earn a return of 6 per cent on its investment.

The company had asked for increases totaling $2,150,000 a year and a return of 7.5 per cent.

Both the company and the protestants appealed the order to the courts, and in March 1954, Superior Court Judge Walter J. Bone sent the case back to the commission for any changes it might consider proper in the light of a North Carolina Supreme Court decision in a Southern Bell rate case and for further hearings if any of the parties wished.

Before the commission could get the case set for reconsideration, several hurricanes ripped through Carolina T&T's territory and because of the abnormal effect they had on the company's operations the rate case was allowed to sit.

Recently, all parties involved in the original hearings were consulted by the commission, and none desired further hearings.

Therefore, the commission issued an order reviewing the case, and stating that a new analysis, taking into account all factors and the effect of the supreme court decision, brought out that the rates set in 1953 were those needed to produce the net revenues required to cover the company's financial obligations. It stated that the rates as granted in 1953 proved to be no more and no less adequate to yield a return of 6 per cent on the fair value of the company's investment for the period covered by the 1953 rate case, and thus the case was closed.

Kan. Commission OKs Sale

The Kansas Corporation Commission recently approved the transfer of the Lenora and Morland exchanges to Rural Telephone Service Co. Inc., of Lenora (TELEPHONY, June 2, p. 37).

Petitions to Sell in Wis.

The Wisconsin Public Service Commission was scheduled to hear on Aug. 30 the application of the West Side Mutual Telephone Co. for authority to sell to Greenwood Telephone Co.

N. C. Commission Reiterates Stand on Co-op Territories

The North Carolina Utilities Commission in two separate cases on Aug. 23 reiterated that a telephone membership corporation has "no exclusive territory rights to be free of competition in any particular area," and in so doing ordered two commercial telephone companies to provide service to petitioning residents of areas which rural membership cooperatives contended was exclusively theirs.

The commission stuck to the position it took in a similar case recently, which has brought down upon it a storm of protest by various membership cooperative officials, and rejected the contention of the memberships that it should dismiss the cases for lack of jurdisdiction (TELEPHONY, Aug. 18, p. 34).

The latest decisions are expected to increase activity of membership cooperative leaders, who have expressed fear that the position of the commission threatens the future of memberships throughout the state, and, if followed by utility regulating bodies elsewhere, will affect memberships in other states as well.

In one of the orders, the commission directed the Lee Telephone Co. to serve the communities of Francisco, Collinstown, Wright's Store and Big Creek Church in Stokes County, a case in which the Surry Telephone Membership Corp. had intervened (TELEPHONY, June 9, p. 43).

In the other order, it directed Central Telephone Co. to serve groups of residents in six sections of Wilkes County. This was a case in which the Wilkes Telephone Membership Corp. had intervened.

Rejecting the contention of the membership co-ops that it should reject the cases for lack of jurisdiction, the commission held that while it does not have jurisdiction over cooperative memberships, it does have jurisdiction over public utilities, and that it has a responsibility of seeing to it that citizens who want adequate telephone service are provided with it when it is available.

It pointed out that the petitioners asking telephone service in the Wilkes case had testified that they had been trying for five years with no results to get telephone service by means of a telephone membership, and that it is estimated that it will take approximately two more years before the membership corporation can carry out its plans to provide service. It said that the petitioners are entitled to be given service "by any corporation or agency that will best serve their needs at the cheapest rates," and that "five years

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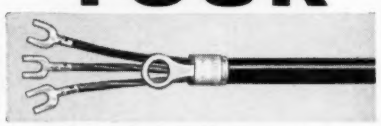
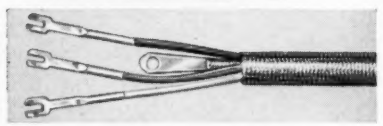


BEST



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Take your choice—Neoprene, Nylon or Cotton. They're all high quality cords made in accordance with Runzel high standard of quality. We carry a large stock of cords for every purpose.

Our geographical location means QUICK SERVICE.

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4723 W. MONTROSE AVE.
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is long enough to wait for a telephone and petitioners should not go without telephone service for two more years when they can properly and efficiently be served by the Central Telephone Co."

The commission said it would take two more years at least for the membership to carry out its plans to establish exchanges in the communities of Lomax, Goshen and Clingman.

In the Stokes County case, the commission said the residents in question had been trying to get telephone service since 1950 and 1951. It said that the Surry Telephone Membership Corp. "is not regularly and legally created and is not legally authorized to render telephone service in the communities of Collinstown, Francisco and Big Creek Church . . . for that in the first instance, no persons residing in these communities, or any other communities, have made any applications to the Rural Electrification Authority that these communities are not provided with telephone service or are inadequately provided with same."

The commission added that no survey has been made of the territory which the corporation proposes to serve, and that some of the 80 persons whose names were on the petition before the body have been trying to get telephone service for five or six years and that many of them paid a membership fee to the Surry corporation "as far back as 1951 but never received any telephone service."

On Aug. 6, the commission, in a similar case, dismissed a motion by the Randolph Telephone Membership Corp., and ordered Central Telephone Co. to provide service to seven residents of Randolph County. REA leaders and telephone membership corporation officials, who have hinted that the issue may be taken to the courts, were still protesting this decision, when the commission handed down its new orders (TELEPHONY, Aug. 25, p. 46).

Some membership officials have indicated that efforts to obtain remedial legislation will be made during the next session of the North Carolina Legislature, which convenes early next January.

Set Two Nebraska Rate Hearings

The Nebraska Railway Commission has set hearings for applications of the Glenwood Telephone Co., Blue Hill, and the Midstate Telephone Co., Heartwell, according to an Aug. 25 report.

The Glenwood hearing on Sept. 21 will concern the company's request for a general increase in rates for all of its six exchanges.

The Midstate company on Oct. 9 will seek authority to sign and deliver a conditional sales contract, establish a schedule of rates and charges and eleminate free extended area service from Heartwell to Kenesaw and Norman.

Alabama Commission Grants Increases in Rates

The Alabama Public Service Commission recently announced rate increases for two towns where expansion of facilities are planned. Even with the raises, the commission asserted, the companies will continue to lose money, but "ultimately" may show a profit.

The increases were granted the Red Level Telephone Co., and the Gantt Telephone Co., both owned by James L. Kirk.

Cost of one-party business service will be raised from $2.00 to $5.00, while one-party residence service will be increased from $1.50 to $3.25.

Two-party business service will cost $4.50, and four-party, $4.00.

Two-party residence service will cost $2.75, and four-party, $2.25.

Approves Security Issue For General of Ohio

The General Telephone Co. of Ohio, Marion, has received authority, as of Aug. 9, from the Ohio Public Utilities Commission to issue securities, the character and amount to be determined at a subsequent date in order to reimburse its treasury for capital expenditures made as of Dec. 31, 1955.

The amount of the uncapitalized capitalizable expenditures at Dec. 31, 1955 which is inclusive of certain securities retired during the year of 1955, is $5,339,130.54.

Mo. Commission Asked to Approve Sale to S. W. Bell

The Missouri Public Service Commission has received an application for approval of the sale of the Fordland Telephone Co., to Southwestern Bell Telephone Co., it was reported recently.

The application was made by Pearl Hale, acting for Clarence E. Hale, owner of the Fordland company.

N. C. Company's Rate Plea Turned Down in Rehearing

The North Carolina Utilities Commission on Aug. 23 rejected exceptions by the Durham Telephone Co. to its May 28 order authorizing the company to increase rates at its Durham and Creedmoor exchanges to provide additional gross revenue of $96,667 annually (TELEPHONY, July 7, p. 36).

The company, which has sought increases totaling $201,000 a year, had

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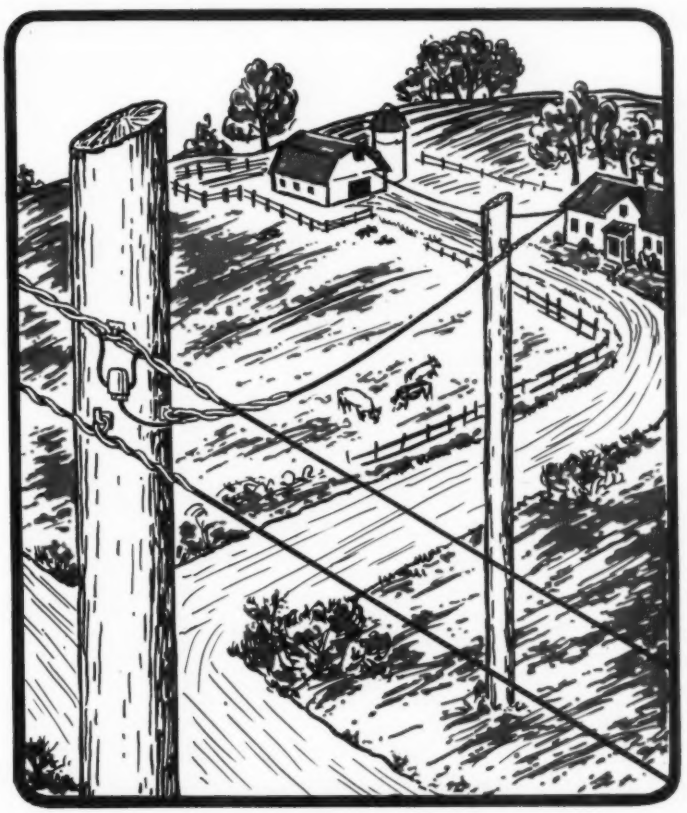

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providing rural extension service at an economical cost. PWC Rur-A-Line is easily installed like a single wire. Maintenance is less than that of open line wire.

Rur-A-Line is moisture and corrosion resistant. It offers excellent protection features with long service life.

PWC Rur-A-Line installations offer the following advantages:

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Rur-A-Line #214

is designed for normal span installations. Two #14 solid extra high strength copperweld conductors, 30% conductivity, are insulated in parallel. The special polyethylene insulation has excellent weathering characteristics. Colored Black.

OD=.145"x.280" 34 lbs./1000 Ft.

Rur-A-Line #212

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waterproof
...from
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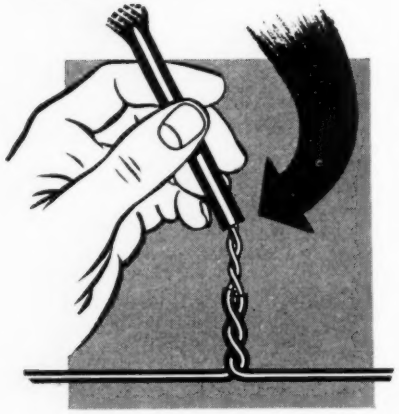

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"Super-Splice" prevents leakage currents and breakdowns in the presence of moisture . . . good for 25,000 v. d. c.

Can be easily removed to re-enter the splice . . . the compound never hardens or oozes out no matter what the temperature.

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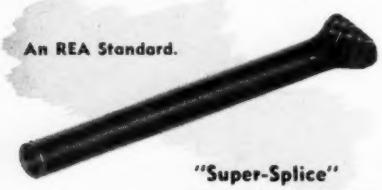

"Super-Splice" is available for use with straight, butt or bridge splices.

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objected to the commission's order on five points: the fair value of the company property, the rate of return allowed, the amount of resultant net operating income, the consideration given by the commission to financial losses from directory advertising, and the commission's disallowance of rate case expenses.

The commission held, however, that the $96,667 additional gross revenue allowed will provide the company a return of 5.81 per cent which it termed "just and reasonable," and "will provide sufficient gross revenue to allow it to pay all of its operating expenses and realize a net income in an amount to sufficiently finance its present capital structure."

The company contended that the commission should have found the fair value of its property to be 6 million dollars, and a 6 per cent rate of return "to be just and reasonable," but the commission reiterated that it considered $5,200,000 to be the fair value of the property. The commission disallowed an item of $80,000 which the company designated as "rate case expense" and which it sought to amortize and recover over a five-year period.

The commission denied the contention that consideration of losses from telephone directory advertising is a "ridiculous departure from lawful rate-making" and "a direct advance further into the field of management."

Commission Member Edward H. McMahan dissented from the new order as he did from the original order on May 28, stating that "it is my opinion that directory profit or loss has no place in a rate case. The expense of preparing a directory has."

"Durham Telephone Co.," McMahan said in his dissenting opinion, "serves the fifth largest North Carolina city. It has given that city the most modern telephone service available, and did so long before many other cities and towns had similar service. Its rates have long been much less than those charged by comparable telephone companies in comparable towns . . . .

"Somewhere along the line the management of that company has exercised some good judgment, and the people of Durham have benefited thereby. Yet here the company is penalized for that very thing. It is not allowed to earn the usual rate of return adjudged to be fair, on the theory that it isn't necessary to do so to pay its interest, dividends and create a surplus."

McMahan said "a return should vary according to the value, the practices of good business judgment and the thrift and economy of the concern involved."

The commission in the majority order stated that "from a technical standpoint the commission has the legal right to fully consider the applicant's losses from directory advertising."

A hearing on the company's exceptions was held on July 16. The city of Durham opposed the original rate increase request and also the granting of the exceptions.

Plan Easier Use of Toll Credit Cards

The United States Independent Telephone Association member letter dated Aug. 24 outlined a new simplified procedure for the use of toll credit cards, which will be made effective by the Bell System on Jan. 1, 1957.

Under the new plan, the customer will give the operator only his credit card number, instead of also giving the name of his home city and telephone number.

The cards and mailing piece for Independent companies will omit the Bell System seal, the yellow pages emblem and the name of the telephone company. The heading of the credit card will be "1957 Telephone Credit Card," similar to the 1956 cards.

Tentatively, plans are to include a reference to the Bell System on these cards under the heading: Honored by Bell System Companies and Most Other Telephone Companies.

Obituary

HUGH W. HOGUE, 76, veteran Independent manufacturer's representative, died on Aug. 23 in the Highland Hospital, Oakland, Cal., following a heart attack. He had moved to California from Indianapolis, Ind., a few years ago.

Mr. Hogue retired as Indiana representative for the Kellogg Switchboard & Supply Co. in July 1948, which position he had held for more than 30 years.

Prior to going with the Kellogg company, he worked in the installation departments of Automatic Electric Co. and Western Electric Co. and in the sales department of Leich Electric Co.

He is survived by a daughter, Mrs. Retha Weise of Hayward, Cal.

Observe Golden Anniversary

Fifty years of married life were celebrated on Aug. 19 by the Alfred L. Ericsons of Hector, Minn. He is secretary and treasurer of the Minnesota Central Telephone Co., Hector, and manager of the Hector Telephone Co.

PROTECTION PROBLEMS

Continued from page 22

reduction in the number of troubles in station fuses, in cable terminal stubs and in central office heat coils.

Protection of Rural and Urban Wires

Rural and urban wires have been developed to give a higher degree of flexibility and economy to the telephone distribution plant. Rural wire consists of six twisted pairs of individually insulated 19-gauge conductors, which are stranded around an insulated steel support wire. Urban wire consists of 16 pairs of individually insulated 24-gauge conductors, which are bunched into four groups and stranded about an insulated steel support wire. Both types of wire are tested with 10,000 volts dc between conductors and between each conductor and the support wire.

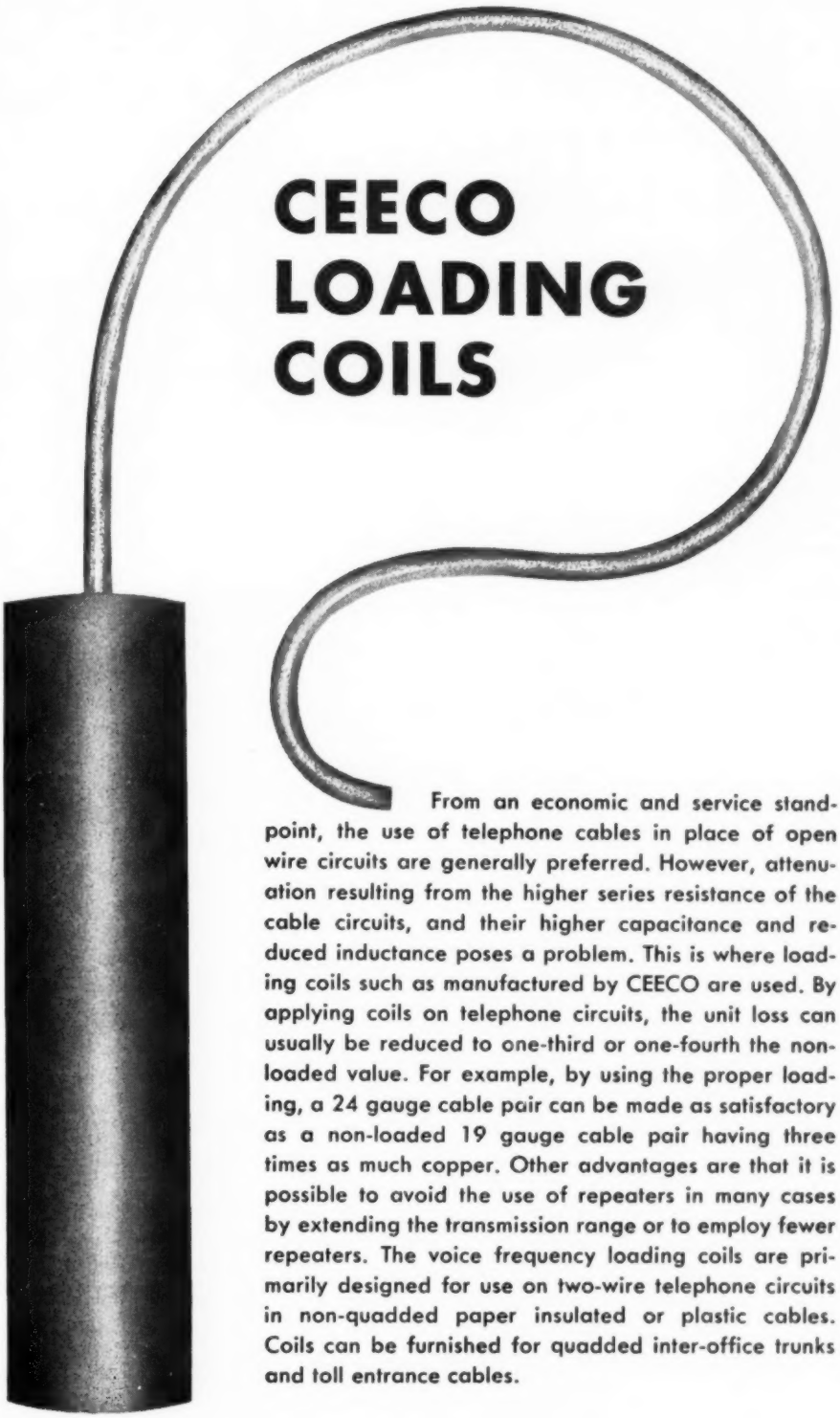
As the two structures are very much alike in their susceptiveness to damage from foreign potential, it is possible to apply essentially the same protection to each. However, urban wire will, in general, be installed in shorter lengths than rural wire and consequently some of the protection specifications will not apply. In addition, the protection apparatus applied to each type may in some cases be different, due to the greater conductivity of rural wire.

The high dielectric strength insulation used on the conductors of these two types of wire gives them some of the attributes of polyethylene insulated conductor cable. For this reason, protector blocks will be necessary at the junction of these wires and paper insulated cables to equalize any potential differences which may appear at the junction point.

On the other hand, no protection is required at the junction of rural or urban wire and polyethylene insulated conductor cables as the dielectric strengths of the structures are of the same magnitude. When open-wire extensions or drop wire runs are connected to rural or urban wires, protection need only be installed at each junction point if the open wire or drops are highly exposed to lightning.

The dielectric strength of the plastics used on rural and urban wires is such that power contacts to new wires will not energize the conductors, at least not on the more common joint-use power voltages. It should be recognized, however, that physical damage to the insulating material associated with the power contact may cause its dielectric strength to be degraded to the point where the conductors will be energized. This might also occur on undamaged

You can reduce unit loss and use of repeaters with



CEECO LOADING COILS

From an economic and service standpoint, the use of telephone cables in place of open wire circuits are generally preferred. However, attenuation resulting from the higher series resistance of the cable circuits, and their higher capacitance and reduced inductance poses a problem. This is where loading coils such as manufactured by CEECO are used. By applying coils on telephone circuits, the unit loss can usually be reduced to one-third or one-fourth the non-loaded value. For example, by using the proper loading, a 24 gauge cable pair can be made as satisfactory as a non-loaded 19 gauge cable pair having three times as much copper. Other advantages are that it is possible to avoid the use of repeaters in many cases by extending the transmission range or to employ fewer repeaters. The voice frequency loading coils are primarily designed for use on two-wire telephone circuits in non-quadded paper insulated or plastic cables. Coils can be furnished for quadded inter-office trunks and toll entrance cables.

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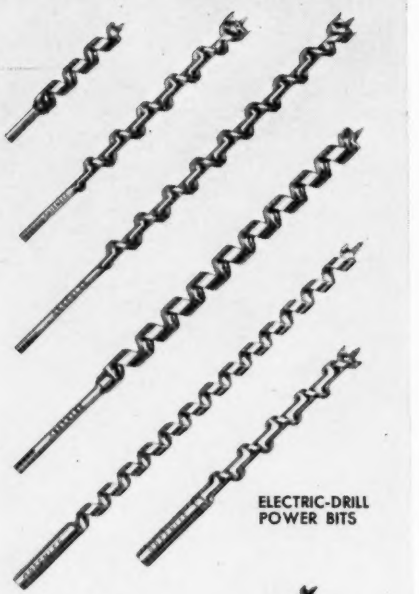

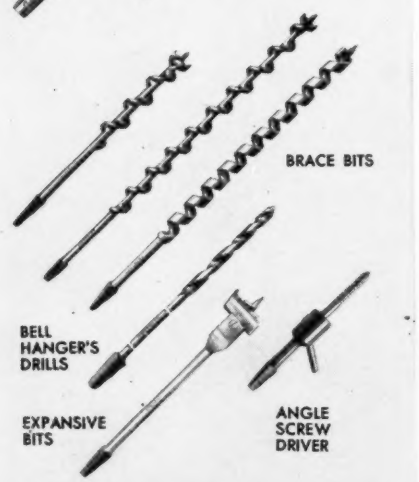

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Whether you need to bore deep or shallow holes, small or large, there is a GREENLEE bit, drill, or auger for the job! Various lengths and styles for electric drill or hand-brace use. All of highest quality materials and correct design for easy boring, clean cutting, and long life under hard usage. Stocked by leading telephone supply distributors . . . see yours or write direct for literature.

Greenlee Tools Co. 2069 Columbia Ave., Rockford, Ill.

wire if lightning were to puncture the insulation on a rural or urban wire in contact with a power conductor.

Because of the possibility of conductor energization, rural and urban wires are treated as open-wire conductors, which means that fused-type station protectors must be used on stations that they serve. For power systems with voltages-to-ground of less than 3 kv., the fuse in the subscriber's station protector will blow and isolate the station, should the wire facility become energized.

For power systems with voltages-to-ground greater than 3 kv., an energized conductor may have sufficient potential on it to cause the station fuse to blow and hold over. It is necessary, in such a case, to apply the same rules which hold for higher voltage joint use on open wire. These requirements call for spaced supplementary protection between each of the conductors and ground. Ground is supplied by the support wire, which must therefore be connected to the power system multi-grounded neutral.

Grounding of the support wire tends to furnish the equivalent of a grounded metallic cable sheath. It is true that the support wire is insulated and is situated in the middle of the wire structure, but tests have shown that there is almost always an arcing type of contact when plastic insulated conductors are energized. The heat of the arc often causes the support wire to be energized also at the point of contact. When it becomes energized, the fault impedance is lowered, which tends to hold down the plant potential rise and at the same time hastens de-energization of the power supply.

The spaced supplementary protectors furnish a low impedance fault path to ground and assure prompt and positive de-energization of the power system. They also hold down the voltage on the telephone plant to prevent holdover of the station fuse. Because of the different sized conductors involved, rural wires are protected at one-half mile intervals and urban wires are protected at one-fourth mile intervals. In addition, both facilities should be protected at or very near both ends.

If, in the remote case, the stations are few and widely spaced, supplementary protection at the drop locations and at the ends of the wire facility will be less expensive than regularly spaced supplementary protectors. This latter scheme is clearly more difficult to administer if stations may be added along the wire route at a later date.

TERMINAL-PER-STATION OPERATION

Continued from page 28

cepting is to be given at a distant point, trunk-concentrating switches should be used to reduce the cable pairs required. These switches may be rotary type or line finders. A typical arrangement is shown by *Fig. 6*. With a common for each 50 terminals, one 200-point line finder concentration group has capacity for a total of 10,000 terminals. If all intercepting trunks to the central office are busy, a calling subscriber will hear ringing tone from the connector until a trunk becomes available and is seized by the finder.

Mechanical Intercepting: The use of a mechanical intercept-announcement machine greatly reduces the cost of giving intercepting service. In small offices and offices remote from a manual switchboard, the intercepting trunks may be connected to a simple local announcement machine which is arranged to start whenever a connection reaches an intercepting trunk. All non-working

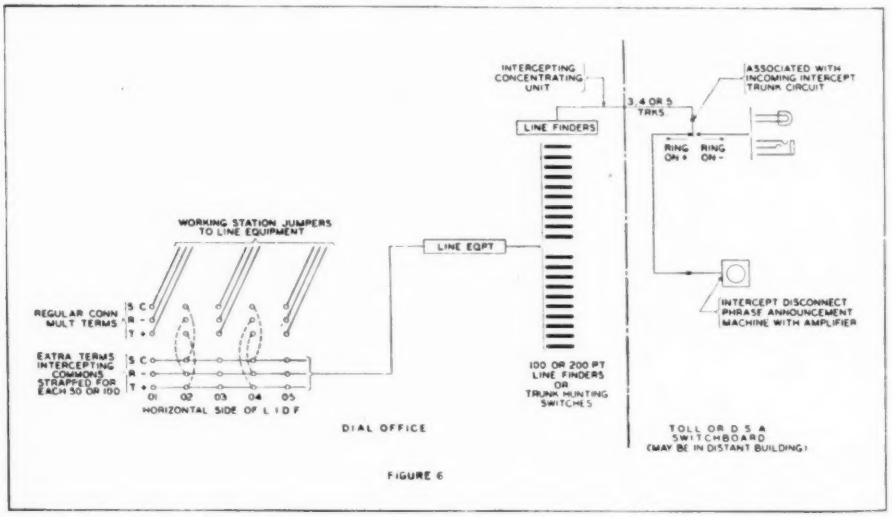

INTERCEPTING CONCENTRATING UNIT
ASSOCIATED WITH INCOMING INTERCEPT TRUNK CIRCUIT
3, 4 OR 5 TRKS
LINE FINDERS
RING ON +
RING ON -
WORKING STATION JUMPERS TO LINE EQUIPMENT
LINE EQPT
REGULAR CONN MULT TERMS
EXTRA TERMS INTERCEPTING COMMONS STRAPPED FOR EACH 50 OR 100
HORIZONTAL SIDE OF L I D F
100 OR 200 PT LINE FINDERS OR TRUNK HUNTING SWITCHES
INTERCEPT DISCONNECT PHRASE ANNOUNCEMENT MACHINE WITH AMPLIFIER
DIAL OFFICE
TOLL OR D S A SWITCHBOARD (MAY BE IN DISTANT BUILDING)
FIGURE 6

Fig. 6

XUM

terminals of the office would be connected to this machine. The wording of the recorded announcement might be: "The number you have reached is a non-working number. Please call information to verify the number you are calling. This is a recording."

In larger offices or where concentrating equipment and trunks to an operator-switchboard are feasible, the so-called "double-barrel" intercepting circuit is used at the switchboard end (see Fig. 6). This circuit is so arranged that if ringing current is received over the negative conductor, the operator's intercepting trunk lamp will be lighted and she answers with: "What number are you calling please?", and after consulting her record gives the status of the called number. If ringing current is received over the positive or tip conductor of the trunk, connection is automatically made to the announcement machine.

To provide operator interception of a terminal, the LIDF strap is connected straight as shown for Terminal "02" in Fig. 6. When it is desired to provide machine interception, the strap is connected reversed as for terminal "04."

Only terminals to which a changed number or other verbal report applies are connected for operator intercept. All vacant, straight disconnect, and disconnected for non-payment terminals, are connected for machine interception. The wording generally used for this announcement is: "The number you have reached has been disconnected. You may have the wrong number in mind or you may have dialed incorrectly. This is a recording." It should be noted that the number which the subscriber has reached may not be the number which he believes he has dialed; therefore, the wording and the note of caution.

Conclusion

It will be evident from the information presented in this article, that terminal-per-station operation has many advantages from the standpoint of efficient exchange operations and improved subscribers service. Telephone managements of terminal-per-line offices should carefully weigh the numerous advantages offered by terminal-per-station operation against the increased investment required for terminal-per-station equipment. The discussions and explanations included herein should prove helpful in directing attention to the various factors which should be considered in such studies.

State of Maturity

"There is a time in every man's education when he arrives at the conviction that envy is ignorance."—EMERSON.

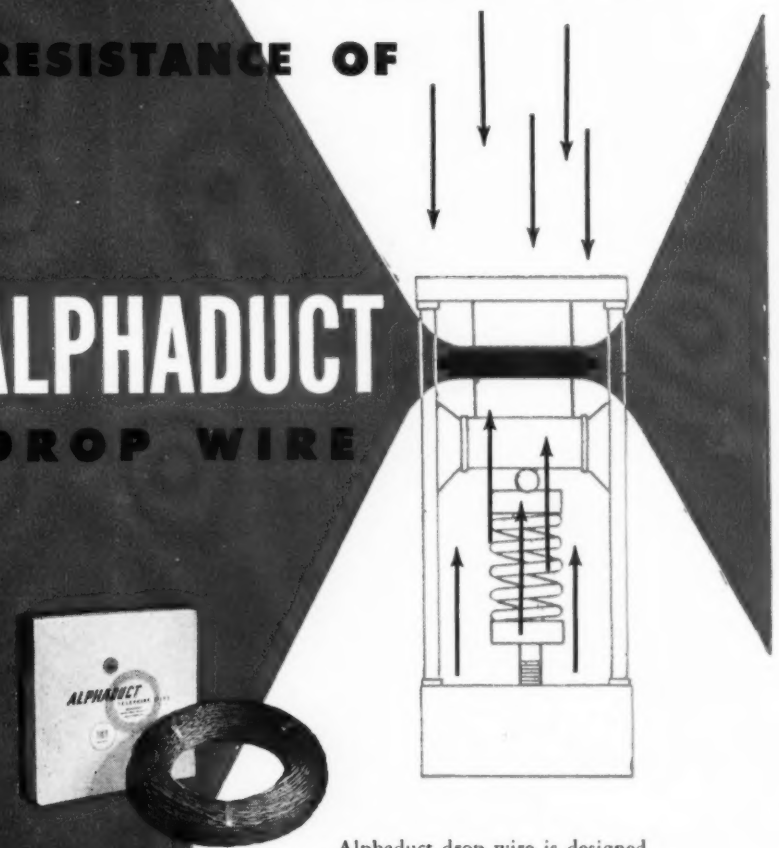
1500 pounds

MINIMUM COMPRESSION

RESISTANCE OF

ALPHADUCT

DROP WIRE



Alphaduct drop wire is designed and built to be the longest lasting drop wire you've ever installed. It's tested . . . completely, thoroughly and often to make sure that every single coil is up to Alphaduct's rigid standards.

Here's how the insulation is tested to make sure it won't crush.

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You don't have to worry about a little rough handling breaking down this kind of tested insulation. Try Alphaduct drop wire. It's dated, so you can see for yourself the extra wear it provides.

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THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO

PROCESSING TROUBLE OR REPAIR CALLS

Concluded from page 32

tab guide on which the first two digits occur. In a matter of a second or two, she has the name and address of the number.

She gets additional data according to the color of the Linedex insert, and by the colored acetate signals which are clipped over the left edge of certain inserts. Buff inserts, for instance, are for party lines. Salmon-colored inserts designate private lines, white for telephones temporarily disconnected, and blue for private exchanges.

Purple signals designate telephones that are out of order. Orange signals show private lines grounded, and green signals are for telephones whose service has been suspended because of nonpayment.

If the operator finds that the complaint involves a working number, she makes out a written report. This is checked against a file where the entire history of a line is kept on line cards arranged in a tub desk. The complaint then goes to the test board, which tests the line and dispatches a repair crew if necessary.

Now, when a trouble call comes in, the complaint slip is on its way to the test board for action within a matter of seconds. Customers are no longer kept waiting for the operators to get them; telephones do not remain out of order for an unnecessarily long time.

Where formerly we had only one record on each line, we now have a complete card file plus the quick-reference Linedex records. If we get a request for information on a number from the newspapers or Western Union, we provide it speedily without tying up the time of one of our clerks.

Above all, we have taken a big step forward toward a goal which all telephone companies must keep constantly in view: Optimum customer service, with consequent excellent public relations.

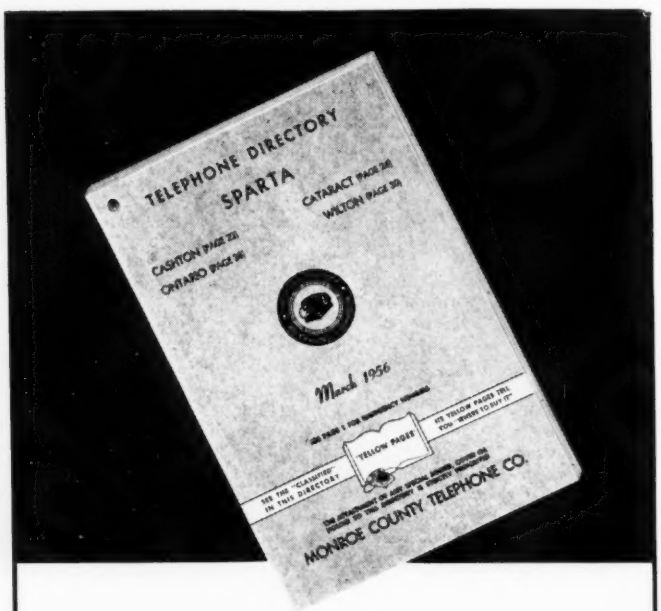
Bell's Electronic Eye Aids Blind PBX Operators

An electronic "eye" weighing less than an ounce has been developed by Bell Telephone Laboratories as an aid to blind operators of private telephone switchboards.

A tiny, light-sensitive phototransistor which fits on the tip of an index finger is the only piece of equipment which must be worn by the blind operator in addition to the standard operator's headset.

Closeup of electronic "eye" developed by Bell Telephone Laboratories as an aid to blind operators of private telephone switchboards.

The device, which is still experimental, will be tried out soon by blind operators of private switchboards un-



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One of the most important subjects, if not the ***most important subject***, constantly confronting utility managements, regulatory commissions and others concerned, is the ***amount of return*** to be ***allowed public utility companies*** and ***how best*** to ***determine that return.*** After almost four years of research, study, and analysis, Ellsworth Nichols, Editor of PUBLIC UTILITIES REPORTS and author of other publications on regulation, has completed his new volume ***"RATE OF RETURN."***

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While the basic concept of identifying lighted switchboard lamps by means of photo-electric cells is not new, the Bell equipment is unique in its use of transistors, and its extremely small size and light weight. It may make possible a system that is sufficiently economical and practical for use by blind operators of private switchboards.

The Cream Valley Telephone Co., Hawkins, Wis., recently adopted this new emblem, intending that the emblem identify the state in which it operates and its service area within that state. The company's new dial service is featured, and the emblem is attractively colored using the company color of royal blue highlighted by colors of pink, yellow, and gray. A large colored emblem is located in the office of the company at Hawkins.

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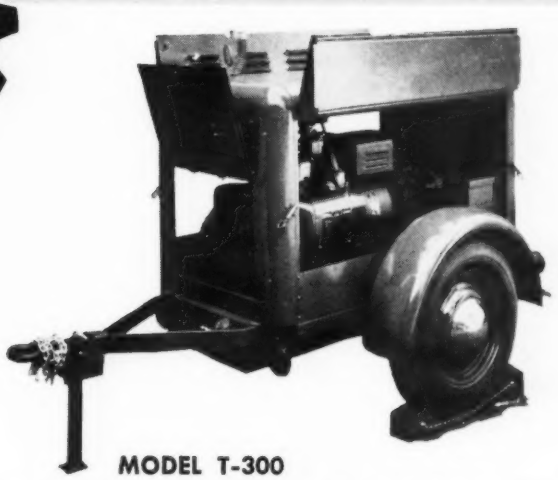

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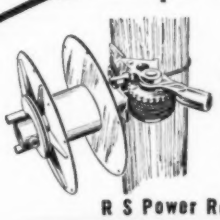

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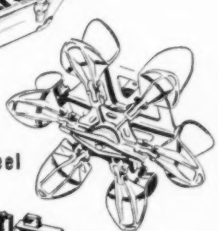

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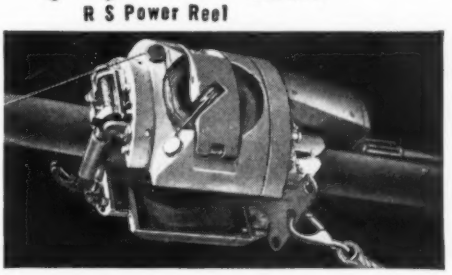

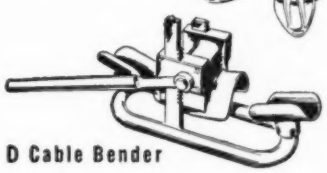

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Ralph Van Trine, Independent Executive, Dies

Ralph Van Trine, 62, executive vice president of the Durham (N. C.) Telephone Co., died on Aug. 18 of a heart attack.

A native of Salina, Kan., Mr. Van Trine graduated in 1919 from Kansas State College, where he was a member of Sigma Tau, honorary engineering fraternity.

He began his telephone career in 1920 when he became associated with the United Telephone Co. of Kansas, and served as vice president and traffic superintendent of the company until 1929.

From 1929 to 1934, he was president of the United Telephone Co. of Pennsylvania at Harrisburg, and from 1934 to 1936 he was president of the United Telephone & Electric Co. and its subsidiaries at Abilene, Kan.

He next was associated with the Telephone Services, Inc., and served as vice president of that company from 1936 to 1940. He had been executive vice president of the Durham Telephone Co. since 1940.

Mr. Van Trine was active in national and state telephone association affairs. He was a member of the Independent Telephone Pioneer Association and Armed Forces Comunications Association.

RALPH VAN TRINE

His wife died in April 1954.

Surviving are one daughter, Mrs. Marian Van Trine Davis of Tallahassee, Fla.; a sister, Mr. Vernon Brodine of Salina, Kan.; and two grandchildren.

USITA, Bell Study Dropping Intertoll Flashing Signal

The United States Independent Telephone Association, in its member letter dated Aug. 24, announced that the Bell System had informed the association that Bell proposes to eliminate the flashing signal on the intertoll dialing network.

In a letter to Fred E. Norris, chairman of the USITA Dial Interexchange Committee, W. A. Stevens, systems planning engineer of the American Telephone & Telegraph Co., has stated it is proposed to substitute a tone signal. This would mean that the operator would have to remain in on the connection on some station-to-station sent-paid calls until she had audible ringing or busy.

It is thought that the accompanying operating penalties would not be great and would tend to decrease as customer dialing of these calls is extended. If controlled start of ringing were eliminated, only relatively few calls would experience a slight service penalty.

The Bell System states that it is confident that circuitry can be developed to handle in another way the prepay coin-controlled feature now provided by the toll train.

Mr. Stevens is reported to have expressed the opinion that one of several advantages of the proposal is that it will permit elimination of separate toll switching trains in new step-by-step automatic offices.

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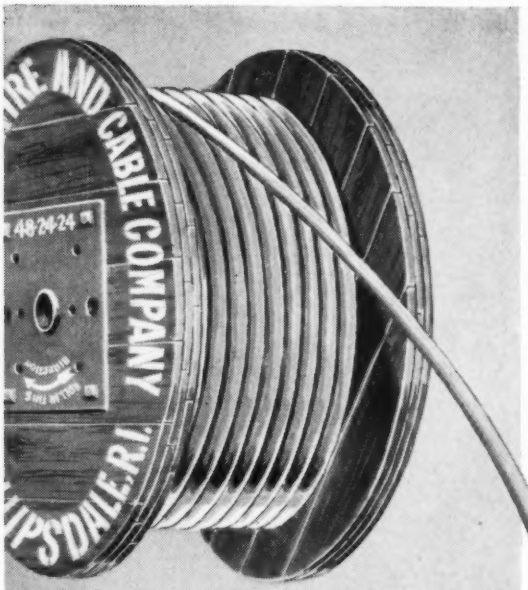

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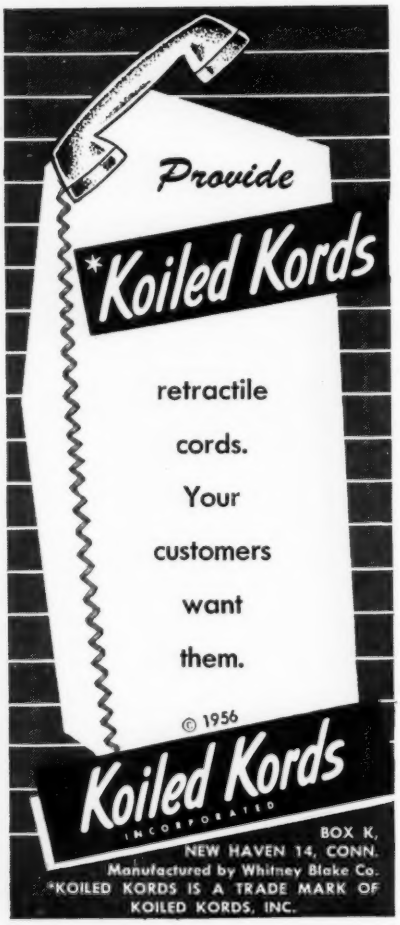

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Independent companies provided separate toll switching trains in larger step-by-step offices for transmission reasons.

Subsequently, other features such as flashing signal, controlled start of ringing and prepay coin control were added to the toll train. However, with improved instruments the transmission requirements of a toll grade battery supply have been eliminated.

If the remaining features provided by the train could be given up or provided on local train (and thus the need for separate toll trains eliminated), the following advantages, according to the Bell System, could be realized:

(1) Reduced central office cost.

(2) Earlier provision of inward dialing.

(3) More rapid integration of offices not provided with flashing signal to the nationwide dialing network.

(4) More personalized service on operator handled calls.

The proposal is still in the formative stage and is receiving further analysis and study by the Bell System and by the USITA Dial Interexchange Committee. The AT&T has asked Bell companies to submit their comments for consideration before a decision is made.

The USITA Dial Interexchange Committee has asked for comments or suggestions on the proposal by Independent companies. They should be submitted to Leonard L. Ruggles, chairman, USITA Dial Interexchange Technical Sub-committee, c/o Automatic Electric Co., 1033 W. Van Buren St., Chicago 7, Ill.

General of Indiana to Move to Fort Wayne

General Telephone Co. of Indiana, Inc., will move its general offices from Lafayette to Fort Wayne within the next few months, according to an announcement by L. H. Meyer, of Lafayette, president.

General of Indiana, the state's largest Independent telephone company, serves 144,000 telephones through 73 exchanges in the northern two-thirds of Indiana. Its parent company, General Telephone Corp., recently acquired the Home Telephone & Telegraph Co. in Fort Wayne and the Citizens Independent Telephone Co. in Terre Haute.

Principal reason for the move, according to Mr. Meyer, is the need for more office space in a building more suitable for future expansion. Approximately 100 employes will be transferred to Fort Wayne while the revenue accounting department of approximately 80 employes will remain in Lafayette. The move is scheduled for completion by Jan. 1, 1957.

The company employs 1,500 persons, excluding the personnel at Fort Wayne and Terre Haute. When complete integration with these other companies is effected, General of Indiana will serve more than 275,000 telephones within the State.

To Manage Georgia Co-op

Leland E. Wells, manager of Russell Home Telephone Co., Jamestown, Ky., has resigned effective Aug. 26, and has accepted a position at Rentz, Ga. as general manager of the Progressive Rural Telephone Cooperative, it was reported on Aug. 16.

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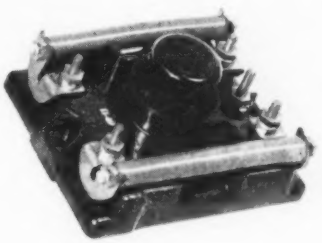

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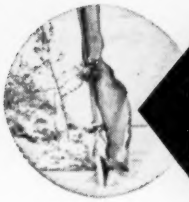

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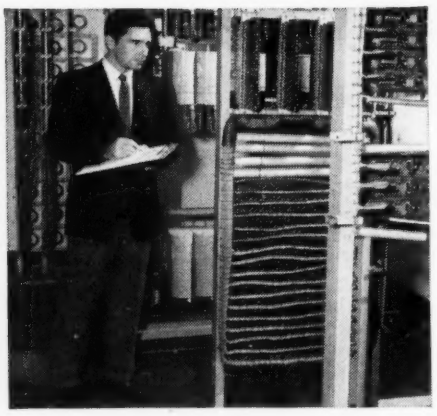

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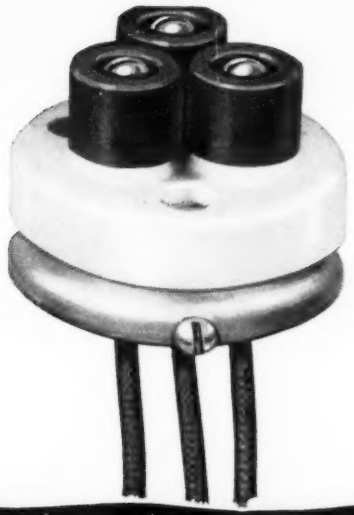

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